(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号

特開平10－254061

(43)公開日　平成10年(1998)９月25日

(51)Int.Cl.[6]	識別記号	ＦＩ	
Ｇ０３Ｂ　21/14		Ｇ０３Ｂ　21/14	Ａ
Ｇ０２Ｂ　27/18		Ｇ０２Ｂ　27/18	Ｚ

審査請求　未請求　請求項の数７　ＯＬ　（全 10 頁）

(21)出願番号　特願平9－53418

(22)出願日　平成９年(1997)３月７日

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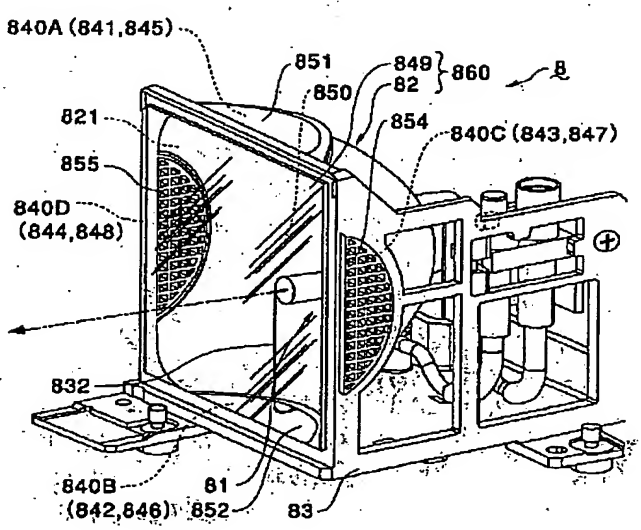
(54)【発明の名称】　光源装置および投写型表示装置

(57)【要約】

【課題】　ランプ破片が外部に飛散しないように反射鏡開口部が透光板で覆われた光源装置において、ランプの過熱を防止可能とすること。

【解決手段】　光源装置８は、ランプ８１と、ランプ８１からの発散光を反射して略平行光として出射する反射鏡８２と、反射鏡８２の開口部を覆う透光板８４９を有している。反射鏡８２と透光板８２によって構成される区画壁８６０には、ランプ８１が配置された区画室８５０と外部をつなぐ通気口となる開口８４０Ｃ、８４０Ｄが形成されている。これらの口８４０Ｃ、８４０Ｄには、ランプ８１が破裂した時のランプ破片が外部に飛散しないようなメッシュ寸法の金属メッシュ８５４、８５５が装着されている。従って、ランプ破片が外部に飛び散るのを防止できると共に、区画室８５０に外部から冷却風を供給できるので、ランプ８１を効率良く冷却できる。



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【特許請求の範囲】

【請求項１】　ランプと、当該ランプからの発散光を反射して略平行光として出射する反射鏡と、当該反射鏡の開口部に位置する透光板とを有し、前記ランプが少なくとも前記反射鏡と前記透光板とを含む区画壁によって区画された区画室に配置された光源装置において、

前記区画壁は、前記区画室と外部との間の通気を確保するために、少なくとも１つの通気口を備えており、当該通気口は、前記ランプが破裂した時に生じるランプ破片が外部に飛散するのを阻害可能な構造であることを特徴とする光源装置。

【請求項２】　請求項１において、前記通気口は、前記反射鏡の前記開口部を規定している開口縁の一部を切り欠いた部分に設けられていることを特徴とする光源装置。

【請求項３】　請求項１または２において、前記通気口はふるい目構造であることを特徴とする光源装置。

【請求項４】　請求項１乃至３のいずれかにおいて、前記透光板は紫外線遮蔽機能を備えていることを特徴とする光源装置。

【請求項５】　請求項１乃至４のうちの何れかの項に記載の光源装置と、当該光源装置から出射される光束に対して画像情報に対応した変調を施す変調手段とを有することを特徴とする投写型表示装置。

【請求項６】　請求項５において、前記通気口の外側には、前記区画室に冷却風を供給するファンが配置されていることを特徴とする投写型表示装置。

【請求項７】　請求項１乃至４のうちの何れかの項に記載の光源装置と、当該光源装置から出射される光束を少なくとも２色の色光束に分離する色分離手段と、当該色分離手段によって分離された各色の光束に対して画像情報に対応した変調を施す変調手段とを有することを特徴とする投写型表示装置。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、投写型表示装置の光源として用いるのに適したメタルハライドランプ等のランプを備えた光源装置に関するものである。また、本発明は、この光源装置が組み込まれた投写型表示装置に関するものである。

【０００２】

【従来の技術】メタルハライドランプ、キセノンランプ等のランプは、投写型表示装置の光源として利用されている。特に、メタルハライドランプは他の形式のランプに比べて発光効率に優れ、長寿命であり、演色性にも優れているので、投写型表示装置の光源として広く利用されている。一般には、このようなランプは、反射鏡と共にランプハウジングに組み付けられたユニット形式の光源装置として用いられている。

【０００３】ランプは、点灯中に発光管内の蒸気圧が高

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まることに起因して破裂するケースがあり、この時飛散するランプの破片によって、隣接する投写型表示装置の各部分を傷つけてしまう可能性がある。このような弊害を回避するため、反射鏡の開口部をガラス板等の透光板によって封鎖して、この透光板および反射鏡によって区画された密閉空間内にランプを配置した構成の光源装置が特開平８－７８４１号公報に開示されている。

【０００４】

【発明が解決しようとする課題】ランプは、点灯中には発光管内の電極間にアークが形成されるので高温になりやすい。しかし、特開平８－７８４１号公報に開示の光源装置では、ランプが透光板と反射鏡によって区画された密閉空間内に配置されているので、ランプの発熱が密閉空間内を高温にしてしまう。この結果、ランプは過熱状態に陥りやすい。例えば、密閉空間内に配置されたメタルハライドランプは、１０００℃程度までランプの温度が上昇する可能性がある。ランプは、高温になると、寿命が短くなり、しかも、変形して破裂しやすくなる。これにより、光源装置の信頼性の低下につながってしまう。

【０００５】そこで、本発明の課題は、ランプ破片が外部に飛散することのないように反射鏡開口部が透光板で閉鎖された構成の光源装置において、ランプが過熱状態に陥ることを防止可能な光源装置を提案することにある。また、本発明は、この光源装置を光源として用いた投写型表示装置を提案することにある。

【０００６】

【課題を解決するための手段】上記課題を解決するため、本発明では、少なくとも反射鏡と透光板を含む区画壁によって区画された区画室にランプが配置された構成の光源装置において、前記区画室の通気を確保するための通気口を区画壁に設けることにより、ランプの熱負荷を低減するようにしている。また、通気口の形成位置および構造を工夫してランプが破裂しても、ランプの破片が外部に飛散しないようにしてある。すなわち、本発明では、ランプと、当該ランプからの発散光を反射して略平行光として出射する反射鏡と、当該反射鏡の開口部に位置する透光板とを有し、前記ランプが少なくとも前記反射鏡と前記透光板を含む区画壁によって区画された区画室に配置された光源装置において、前記区画壁に前記区画室と外部との通気を確保するために、少なくとも１つの通気口を設け、当該通気口が前記ランプが破裂した時に生じるランプ破片が外部に飛散するのを阻害可能な構造であることを特徴としている。

【０００７】本発明の光源装置では、通気口を介してランプが配置された区画室と外部が連通しているので、区画室内から外部に流出する空気流によって、ランプが冷却される。これにより、ランプが過熱状態に陥ることを防止できるので、ランプを長寿命に保つことができ、しかも、ランプの変形を防ぎ、この変形に起因したランプ

破裂を防止できる。また、本発明では、通気口を設けてあっても、この通気口はランプが破裂したときに生じるランプ破片が外部に飛散しないような構造となっている。従って、ランプ破片が外部に飛散することに起因して発生する弊害も回避できる。

【０００８】本発明においては、区画壁が反射鏡と透光板で構成される場合、前記通気口を前記反射鏡の前記開口部を規定している開口縁の一部を切り欠いた部分に設けることが好ましい。ランプからの発散光は反射鏡で反射されて平行光として出射されるので、通気口を発散光が反射される部分に設けると、発散光が散乱するなどの弊害が生じる。本発明によれば、発散光の反射に殆ど関与しない部分に通気口を設けてあるので、上記の弊害を回避できる。

【０００９】また、反射鏡と透光板との間に距離があり、板金等の側壁がその間に設置される場合は、反射鏡、側壁、透光板によって区画壁が構成される。この際は、側壁に通気口を設けても良い。

【００１０】前記通気口の構造としては、網目等のふるい目構造とすることができる。この場合には、反射鏡に直接網目形状の通気口を形成しても良く、また、予め大きな開口を形成しておき、その開口に後から網目やメッシュ等のふるい目構造を有する部材を装着するようにしても良い。

【００１１】ここで、メタルハライドランプは点灯時には多量の紫外線を放射しているので、透光板に紫外線遮断機能を持たせておくことが望ましい。このように構成することで、光源装置からの紫外線の放出を防止できるので、紫外線による投写型表示装置の各部分の劣化を防ぐことができる。

【００１２】本発明の光源装置は、例えば、光源装置から出射される光束に対して画像情報に対応した変調を施す変調手段を有する投写型表示装置の前記光源として用いることができる。この場合は、区画壁に設けられた通気口の外側に、区画室内にランプを冷却するための冷却風を供給するファンを設けておくことが望ましい。このファンによって供給される冷却風により、ランプの冷却効率を高めることができる。

【００１３】本発明の光源装置は、特に、光源から出射される光束を少なくとも２色の色光束に分離する色分離手段と、当該色分離手段によって分離された各色の光束に対して画像情報に対応した変調を施す変調手段とを有するカラー画像表示用の投写型表示装置の前記光源として用いるのに適している。

【００１４】

【発明の実施の形態】

（光源装置）以下に図面を参照して本発明を適用した光源装置を説明する。図１には本例の光源装置を斜め上方から見た場合の外観を示してあり、図２には光源装置の概略断面構成を示してある。また、図３には反射鏡とランプハウジングの一部を取り出して示してある。

【００１５】これらの図に示すように、光源装置８は、ランプ８１と、このランプ８１が取り付けられた反射鏡８２と、この反射鏡８２が取り付けられている樹脂製のランプハウジング８３を備えている。

【００１６】本例のランプ８１はメタルハライドランプであるが、キセノンランプ等その他のランプを使用することも可能である。ランプ８１の発光管８１０は石英ガラス製であり、その中央に形成されている発光部８１２は球状に近い楕円形状をしている。この発光部８１２の両側には電極シール部８１３、８１４が一体形成されている。発光部８１２の内部においては、基端側がシール部８１３、８１４に封入された電極芯棒８１５、８１６が管軸上に、一定の間隔をおいて対向配置されている。また、発光部８１２の内部には、金属ハロゲン化物が封入されている。金属ハロゲン化物は、例えば、沃化ジスプロシウム、沃化ネオジムおよび沃化セシウムである。さらに、発光部８１２には上記の金属ハロゲン化物と共に、バッファガスとしての水銀および始動用補助ガスとしてのアルゴンも封入されている。

【００１７】発光部８１２の内部に位置する電極芯棒８１５、８１６の各先端から僅かに後退した位置には、それぞれタングステン線を密に巻くことにより形成した電極８１７、８１８が配置されている。シール部８１３、８１４の内部に埋設されている各電極芯棒８１５、８１６の基端側は、それぞれモリブデン箔２０１、２０２を介してモリブデンワイヤ２０３、２０４に接続されている。これらのモリブデンワイヤ２０３、２０４の他端側は、それぞれ口金８３１およびニッケルリード線８３２に接続されている。

【００１８】なお、ランプ８１の一方の端から伸びているニッケルリード線８３２は、反射鏡８２の裏面側に引き回されて、外部接続用の端子８５に接続されており、ランプ８１の反対側に位置する口金８３１の底面側にも、外部接続用の端子８６が取り付けられている。

【００１９】一方、反射鏡８２は、断面が放物線状の反射面８２１を備えており、この反射面８２１でランプ８１からの発散光を反射して、略平行光として前方に出射できるようになっている。反射面８２１の底部中央には、ランプ取付け孔８２２が形成されている。この取付け孔８２２に上記構成のランプの口金８３１の部分が挿入され、耐熱性の接着剤によって固定されている。ランプ８１は、この口金８３１に管軸が水平となるように反射鏡８２に取り付けられており、反射面８２１の中心軸線に一致している。

【００２０】ランプハウジング８３は、光出射方向の前面が開口となっている。この開口を備えた前面には、反射鏡８２の反射面８２１で反射されて平行光とされたランプ８１からの発散光を透過可能、かつ、紫外線を遮光する機能を備えた特殊ガラス製の透光板８４９が配置さ

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れている。このように、本例では、透光板８４９によって反射鏡８２における反射面８２１の前方縁である開口部８２Ａが封鎖され、この透光板８４９と反射面８２１によって区画壁８６０が構成され、この区画壁８６０によって区画されている区画室８５０内にランプ８１が配置されている。なお、透光板８４９としては、耐熱性に優れ、強度の高いパイレックス等の硬質ガラスを用いることができる。耐熱性としては、１５０℃～２００℃の温度に耐えられれば良い。また、その厚さは２～５ｍｍ程度とすることが好ましい。２ｍｍより薄いと外部からの衝撃に対して弱くなり、５ｍｍより厚いと熱膨張による破損等の可能性が高くなるためである。

【００２１】本例の区画壁８６０の構成部品の一部である反射鏡８２には、ランプ８１が配置された区画室８５０と外部との通気口８４０Ｃ、８４０Ｄが両側に形成され、これらの通気口８４０Ｃ、８４０Ｄを介してランプ８１が冷却されるようになっている。

【００２２】詳しく説明すると、反射鏡８２において、その開口部８２Ａを規定している開口縁８２Ｂには略半円形状の切り欠き８４１～８４４が上下および両側方の計４箇所に形成されている。一方、ランプハウジング８３の上下および左右には、反射鏡８２に設けられた各切り欠き８４１～８４４と略同形状の窓８４５～８４８が切り欠き８４１～８４４と重なるように形成されている。各切り欠き８４１～８４４および各窓８４５～８４８が重なり合って区画室８５０と外部をつなぐ開口８４０Ａ～８４０Ｄが形成されている。これらの開口８４０Ａ～８４０Ｄの内、上下の開口８４０Ａ、８４０Ｂは、封鎖板８５１、８５２によって塞がれている。これに対して、残りの左右の開口８４０Ｃ、８４０Ｄにはふるい目構造を有する部材としての金属メッシュ８５４、８５５が嵌め込まれ、区画室８５０と外部とを連通する通気口となっている。すなわち、本例では、透光板８４９によって反射鏡８２の開口部８２Ａが塞がれてはいるが、ランプ８１は、密閉された空間内に配置されているのではなく、外部から冷却風を供給可能な区画室８５０に配置されている。なお、本例では、通気口を構成する金属メッシュ８５４、８５５を嵌め込みにより開口８４０Ｃ、８４０Ｄに固定しているが、接着、溶着、ネジ締め等により固定しても良い。また、通気口を構成する材料としては、金属以外にもある程度の耐熱性（１００～１５０℃程度）を備えたＰＥＥＫ、ＰＰＳ等のプラスチック、フッ素繊維、ナイロン、ポリエステル等が考えられる。

【００２３】このように構成した本例の光源装置８においては、例えば、発光管８１０の内部の電極８１７、８１８の間に図２に矢印Ａで示すようなアークが形成されるので、ランプ８１は温度が上昇する。しかし、本例の光源装置８では、前述した特開平８－７８４１号公報に開示の光源装置とは異なり、ランプ８１が配置された区画室８５０と外部をつなぐ開口８４０Ｃ、８４０Ｄが設けられているので、ランプ８１には、外部から区画室８５０に導入される空気によって冷却作用が働き、ランプ８１が冷却される。従って、ランプ８１が過熱状態になることによって生じる様々な弊害、特に、短寿命化および発光管の破裂を回避できる。

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【００２４】本例の光源装置８において、各開口８４０Ｃ、８４０Ｄに嵌め込まれた金属メッシュ８５４、８５５の開口寸法、すなわち、ふるい目の寸法は、ランプ８１が破裂した時に生じるランプの破片が外部に飛び散るのを妨げる程度に設定されている。従って、開口８４０Ｃ、８４０Ｄを設けてあっても、ランプ８１の破片が外部に飛散するのを確実に防止できる。このため、例えば、光源装置８を投写型表示装置の光源として用いた場合などにおいて、光源装置８を除く投写型表示装置の構成部品が飛散したガラス破片で損傷してしまうことを防ぐことができる。なお、ふるい目の寸法は、数ミクロン～数ミリとすることが好ましい。この寸法が大きすぎれば、小さなランプ破片が外部に飛び散ってしまい、一方、この寸法が小さすぎると、風の抵抗が大きくなり通気口としての機能が阻害されてしまうためである。

【００２５】また、本例の光源装置８では、ランプ８１からの発散光は反射鏡８２の反射面８２１で反射されて平行光として前方に向かって出射されるので、通気口が形成される開口８４０Ｃ、８４０Ｄを発散光が反射される部分に設けると発散光が散乱するなどの弊害が生じる。本例の光源装置８においては、開口８４０Ｃ、８４０Ｄは反射鏡８２の開口縁８２Ｂの一部を切り欠くことによって形成されている。この反射鏡８２の開口縁８２Ｂは発散光の反射に殆ど関与しない部分であるため、上記の弊害を回避できる。なお、本例では、ふるい目構造をメッシュとしているが、形状はメッシュに限らず、空気の出入りを阻害せず、ガラス片が飛散しにくい構造であれば良い。

【００２６】本例の透光板８４９には紫外線を遮光できる特殊ガラスを使用している。メタルハライドランプは点灯時に多量の紫外線を放射しているが、この透光板８４９によって紫外線が外部に漏れるのを防止できる。従って、本例の光源装置８を投写型表示装置の光源として用いれば、光源装置８を除く投写型表示装置の構成部品が紫外線によって劣化するのを防止できる。なお、紫外線を遮光する機能を備えた透光板８４９としては、特殊ガラスを使用する代わりに、通常のガラス基板に対して紫外線を遮蔽できる材料の蒸着膜を成膜した構成の透光板であっても良いのは勿論である。また、紫外線の劣化がそれほど顕著でない場合には、通常のガラス基板を使用しても勿論良い。

【００２７】なお、本例の光源装置８では、反射鏡８２の上下の開口８４０Ａ、８４０Ｂを封鎖してあるが、これらの開口８４０Ａ、８４０Ｂの部分を通気口として用

いても良いのは勿論である。この場合にも、ランプの破片が外部に飛び散らないように金属メッシュ等のふるい目構造を各開口８４０Ａ、８４０Ｂに形成すればよい。

【００２８】また、図９～図１２を参照に後述するように、通気口となる開口８４０Ｃ、８４０Ｄの外側にファンを設けて、このファンによって区画室８５０に冷却風を供給するようにしてもよい。この場合には、ファンによって供給される冷却風により、ランプ８１の冷却効率を高めることができる。

【００２９】さらに、本例のように、必ずしも反射鏡８２と透光板８４９によって区画壁８６０を構成する必要はなく、反射鏡８２と透光板８４９の間に側壁を設け、これら３体で区画壁８６０を構成することも可能である。図４にはその光源装置の外観を斜視図を用いて示してあり、図５にはその光源装置の概略構成を断面図を用いて示してある。なお、図４および図５において、上記の光源装置８と共通する機能を有する部分に付いては、同符号を付して詳細な説明は省略する。

【００３０】図４および図５に示す光源装置８Ａでは、パラボラ形をした反射鏡８２の円形の開口縁８２Ｂに対して光出射方向に円筒状に伸びる板金等から形成された側板部材８７が取り付けられている。側板部材８７の光出射方向側の開口部８７Ａに透光板８４９が固定されている。すなわち、本例の光源装置８Ａでは、反射鏡８２、透光板８４９、および側板部材８７の３体によって区画壁８６０が構成されている。区画壁８６０の構成部品の一部である側板部材８７には、区画壁８６０によって区画された区画室８５０と外部との通気口となる開口８４０Ｃ、８４０Ｄが形成され、これらの通気口となる開口８４０Ｃ、８４０Ｄを介して外部から供給される冷却風によってランプ８１を冷却することができるようになっている。このように本例の光源装置８Ａにおいても、ランプ８１には、外部から区画室８５０に導入される空気によって冷却作用が働くので、ランプ８１が過熱状態になることによって生じる様々な弊害を回避できる。

【００３１】また、本例の光源装置８Ａでは、側板部材８７に形成された開口８４０Ｃ、８４０Ｄに対してランプ８１が破裂した時に生じるランプ破片が外部に飛び散るのを妨げる程度の開口形状を有する金属メッシュ８５４、８５５が嵌め込まれている。従って、本例の光源装置８Ａにおいても、外部との通気を確保する開口８４０Ｃ、８４０Ｄを設けてあっても、ランプ８１の破片が外部に飛散するのを確実に防止できる。これにより、光源装置８Ａを投写型表示装置の光源として用いた場合などにおいて、光源装置８Ａを除く投写型表示装置の構成部品が飛散したガラス破片で損傷してしまうことを防ぐことができる。

【００３２】（投写型表示装置）先に説明した光源装置８を備えた投写型表示装置の例を説明する。この投写型

表示装置は、光源装置８からの白色光束を、赤、緑、青の３色光束に分離し、これらの各色光束を液晶パネルから構成されるライトバルブを通して映像情報に対応させて変調し、変調した後の各色の変調光束を再合成して、投写レンズを介してスクリーン上に拡大表示する形式のものである。

【００３３】図６には本例の投写型表示装置の外観を示してある。本例の投写型表示装置１は直方体形状をした外装ケース２を有している。外装ケース２は、基本的には、アッパーケース３と、ロアーケース４と、装置前面を規定しているフロントケース５から構成されている。フロントケース５の中央からは投写レンズユニット６の先端側の部分が突出している。

【００３４】図７には投写型表示装置１の外装ケース２の内部における各構成部分の配置を示してあり、図８には図７のＡ－Ａ線における断面を示してある。これらの図に示すように、外装ケース２の内部において、その後端側には電源ユニット７が配置されている。これよりも装置前側に隣接した位置には、本発明を適用した光源装置８が配置されている。この光源装置８の側方位置には、冷却用の吸気ファン１９が配置されている。本例の投写型表示装置１では、光源装置８のランプ８１が寿命などによって使用不可となった場合には、光源装置そのものを着脱して交換する。光源装置８の前側には光学ユニット９が配置されている。光学ユニット９の前側の中央には、投写レンズユニット６の基端側が位置している。一方、光学ユニット９の側方には、装置前後方向に向けて入出力インターフェース回路が搭載されたインターフェース基板１１が配置され、これに平行に、ビデオ信号処理回路が搭載されたビデオ基板１２が配置されている。さらに、光源装置８、光学ユニット９の上側には、装置駆動制御用の制御基板１３が配置されている。装置前端側の左右の角には、それぞれスピーカ１４Ｒ、１４Ｌが配置されている。

【００３５】光学ユニット９の上面側の中央には冷却用の吸気ファン１５Ａが配置され、光学ユニット９の底面側の中央には冷却用循環流形成用の循環用ファン１５Ｂが配置されている。また、光源装置８の裏面側である装置側面には排気ファン１６が配置されている。そして、電源ユニット７における基板１１、１２の端に面する位置には、吸気ファン１５Ａからの冷却用空気流を電源ユニット７内に吸引するための補助冷却ファン１７が配置されている。

【００３６】さらに、電源ユニット７の直上には、その装置左側の位置に、フロッピーディスク駆動ユニット（ＦＤＤ）１８が配置されている。

【００３７】図９および図１０には光源装置８と吸気ファン１９を取り出して斜視図を用いて示してある。また、図１１には光源装置８と吸気ファン１９を取り出して平面図を用いて示してある。さらに、図１２には図９

のＢ－Ｂ線における断面を示してある。これらの図に示すように、投写型表示装置１に組み込まれた光源装置８には、通気口となる開口８４０Ｄと外側で隣接する位置に吸気ファン１９が配置されている。従って、この吸気ファン１９によって、光源装置８の区画室８５０には、平面的に見て、図１２に矢印Ｄで示すような冷却用の空気流が形成される。このため、吸気ファン１９を配置してない場合に比べて、区画室８５０の空気流通が促進されるので、ランプ８１の冷却効率が向上する。

【００３８】図１３には、光源ユニット９および投写レンズユニット６の部分を取り出して示してある。この図に示すように、光学ユニット９は、その色合成手段を構成しているプリズムユニット９１０以外の光学素子が、上下のライトガイド９０１、９０２の間に上下から挟まれて保持された構成となっている。これらの上ライトガイド９０１、下ライトガイド９０２は、それぞれアッパーケース３およびロアーケース４の側に固定ねじによって固定されている。また、これらの上下のライトガイド板９０１、９０２は、プリズムユニット９１０の側に同じく固定ねじによって固定されている。プリズムユニット９１０は、ダイキャスト板である厚手のヘッド板９０３の裏面に固定ねじによって固定されている。このヘッド板９０３の前面には、投写レンズユニット６の基端側が同じく固定ねじによって固定されている。

【００３９】図１４には、投写型表示装置１に組み込まれている光学系の概略構成を示してある。本例の光学系は、上記の光源装置８の構成要素であるランプ８１と、均一照明光学素子であるインテグレータレンズ９２１およびインテグレータレンズ９２２から構成される均一照明光学系９２３とを備えている。また、均一照明光学系９２３から出射される白色光束Ｗを赤、緑、青の各色光束Ｒ、Ｇ、Ｂに分離する色分離光学系９２４と、各色光束を変調するライトバルブとしての３枚の液晶ライトバルブ９２５Ｒ、９２５Ｇ、９２５Ｂと、変調された色光束を再合成する色合成光学系としてのプリズムユニット９１０と、合成された光束をスクリーン１０の表面に拡大投写する投写レンズユニット６を備えている。さらに、色分離光学系９２４によって分離された各色光束のうち、青色光束Ｂを対応する液晶バルブ９２５Ｂに導く導光系９２７を備えている。

【００４０】均一照明光学系９２３は、反射ミラー９３１を備えており、照明光学系からの出射光の中心光軸Ｌを装置前方向に向けて直角に折り曲げるようにしている。このミラー９３１を挟み、インテグレータレンズ９２１、９２２が直交する状態に配置されている。

【００４１】ランプ８１からの出射光は、このインテグレータレンズ９２１を介してインテグレータレンズ９２２を構成している各レンズの入射面上にそれぞれ２次光源像として投写され、当該インテグレータレンズ９２２から出射光を用いて被照明対象物が照射されることになる。

【００４２】各色分離光学系９２４は、青緑反射ダイクロイックミラー９４１と、緑反射ダイクロイックミラー９４２と、反射ミラー９４３から構成される。白色光束Ｗは、まず、青緑反射ダイクロイックミラー９４１において、そこに含まれている青色光束Ｂおよび緑色光束Ｇが直角に反射され、緑反射ダイクロイックミラー９４２の側に向かう。

【００４３】赤色光束Ｒはこのミラー９４１を通過して、後方の反射ミラー９４３で直角に反射されて、赤色光束Ｒの出射部９４４からプリズムユニット９１０の側に出射される。ミラー９４１において反射された青および緑の光束Ｂ、Ｇは、緑反射ダイクロイックミラー９４２において、緑色光束Ｇのみが直角に反射されて、緑色光束Ｇの出射部９４５から色合成光学系の側に出射される。このミラー９４２を通過した青色光束Ｂは、青色光束Ｂの出射部９４６から導光系９２７の側に出射される。本例では、均一照明光学素子の白色光束Ｗの出射部から、色分離光学系９２４における各色光束の出射部９４４、９４５、９４６までの距離が全て等しくなるように設定されている。

【００４４】色分離光学系９４２の赤色、緑色光束Ｒ、Ｇの出射部９４４、９４５の出射側には、それぞれ集光レンズ９５１、９５２が配置されている。したがって、各出射部から出射した赤色、緑色光束Ｒ、Ｇは、これらの集光レンズ９５１、９５２に入射して平行化される。

【００４５】このように平行化された赤色、緑色光束Ｒ、Ｇは液晶ライトバルブ９２５Ｒ、９２５Ｇに入射して変調され、各色光に対応した画像情報が付加される。すなわち、これらのライトバルブは、不図示の駆動手段によって画像情報に応じてスイッチング制御されて、これにより、ここを通過する各色光の変調が行われる。このような駆動手段は公知の手段をそのまま使用することができる。一方、青色光束Ｂは、導光系９２７を介して対応する液晶ライトバルブ９２５Ｂに導かれ、ここにおいて、同様に画像情報に応じて変調が施される。本例のライトバルブは、例えば、ポリシリコンＴＦＴをスイッチング素子として用いることができる。

【００４６】導光系９２７は、青色光束Ｂの出射部９４６の出射側に配置した集光レンズ９５４と、入射側反射ミラー９７１と、出射側反射ミラー９７２と、これらのミラーの間に配置した中間レンズ９７３と、液晶ライトバルブ９２５Ｂの手前側に配置した集光レンズ９５３とから構成される。各色光束の光路長、すなわち、光源ランプ８０５から各液晶パネルまでの距離は青色光束Ｂが最も長くなり、したがって、この光束の光量損失が最も多くなる。しかし、導光系９２７を介在させることにより、光量損失を抑制できる。よって、各色光束の光路長を実質的に等価にすることができる。

【００４７】次に、各液晶パネル９２５Ｒ、Ｇ、Ｂを通

って変調された各色光束は、色合成光学系９１０に入射され、ここで再合成される。本例では、前述のようにダイクロイックプリズムからなるプリズムユニット９１０を用いて色合成光学系を構成してある。ここで、再合成されたカラー映像は、投写レンズユニット６を介して所定の位置にあるスクリーン１０の表面に拡大投写される。

【００４８】このように構成した投写型表示装置１においては、その光源として、本発明を適用した光源装置８を備えている。この光源装置８は、前述したようにランプ８１を冷却し、さらに、ランプ８１が破裂してもランプ破片が光源装置８の外部に飛び散らないようにしてある。従って、光源装置８を除く投写型表示装置１の構成部品をランプ破片によって損傷させることがなく、しかも、光源の寿命が長い投写型表示装置を実現できる。

【００４９】

【発明の効果】以上説明したように、本発明の光源装置およびこの光源装置を備えた投写型表示装置では、ランプが配置された区画室と外部との間の通気を確保するための通気口を区画壁に設けることにより、ランプの熱負荷を低減するようにしている。また、通気口の開口形状を工夫してランプが破裂しても、ランプの破片が外部に散らばらないようにしてある。従って、区画室内の空気流通が確保されるので、ランプを冷却することができ、ランプを長寿命に保つことができる。また、ランプの変形を防ぎ、この変形に起因したランプの破裂を防ぐことができる。

【００５０】また、通気口を反射鏡の開口部を規定している開口縁の一部を切り欠くことにより形成すれば、発散光が散乱するなどの不具合を回避できる。

【００５１】さらに、透光板に紫外線を遮蔽できる機能を持たせれば、ランプから放出される紫外線を外部に漏れないようにすることができる。これにより、光源装置が組み込まれた投写型表示装置等の光学機器の構成部品の劣化を防ぐことができる。

【００５２】更にまた、区画壁に設けられた通気口の外側に区画室に冷却風を供給するファンを設けておけば、ランプを効率良く冷却できる。

【図面の簡単な説明】

【図１】本発明を適用した光源装置の斜視図である。

【図２】図１に示す光源装置の概略断面構成図である。

【図３】図１に示す光源装置の反射鏡とランプハウジングの一部を取り出して示す斜視図である。

【図４】反射鏡、透光板、および側板部材によって区画壁が構成される光源装置の外観を示す斜視図である。

【図５】図４のＣ－Ｃ線における概略断面構成図である。

【図６】図１に示す光源装置を備えた投写型表示装置の外観を示す斜視図である。

【図７】図６に示す投写型表示装置の内部構成を示す概略平面構成図である。

【図８】図７のＡ－Ａ線における概略断面構成図である。

【図９】光源装置と吸気ファンを正面寄りの斜め上方から見た時の外観を示す図である。

【図１０】光源装置と吸気ファンを裏面寄りの斜め上方から見た時の外観を示す図である。

【図１１】光源装置と吸気ファンを示す平面図である。

【図１２】図９のＢ－Ｂ線における概略断面構成図である。

【図１３】光学ユニットと投写レンズユニットの部分を取り出して示す概略平面構成図である。

【図１４】光学ユニットに組み込まれている光学系を示す概略構成図である。

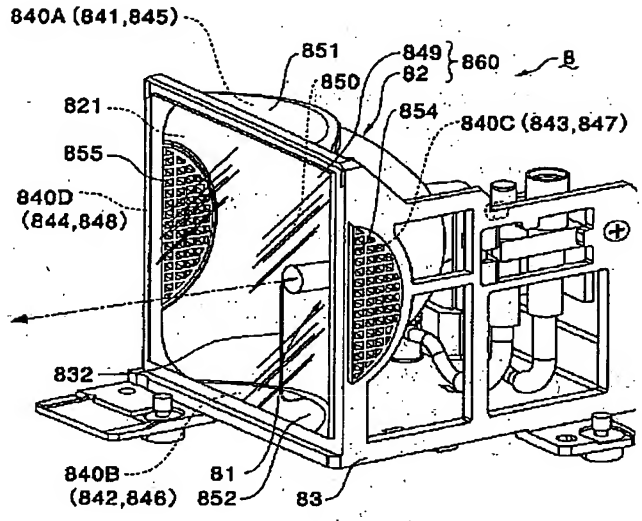
【符号の説明】

１　投写型表示装置
２　外装ケース
３　アッパーケース
４　ロアーケース
５　フロントケース
６　投写レンズユニット
７　電源ユニット
８，８Ａ　光源装置
９　光学ユニット
１０　スクリーン
１１　インターフェース基板
１２　ビデオ基板
１３　制御基板
１４Ｒ，１４Ｌ　スピーカー
１５Ａ　吸気ファン
１５Ｂ　循環用ファン
１６　排気ファン
１７　補助冷却ファン
１８　フロッピーディスクユニット
１９　冷却用吸気ファン
２０１，２０２　モリブデン箔
２０３，２０４　モリブデンワイヤ
８１　放電ランプ
８２　反射鏡
８２Ａ　開口部
８２Ｂ　開口縁
８３　ランプハウジング
８５　端子
８６　ランプ取付け孔
８７　側板部材
８７Ａ　開口部
８１０　発光管
８１２　発光部
８１３，８１４　電極シール部
８１５，８１６　電極芯棒

８１７，８１８　電極
８３１　口金
８３２　ニッケルリード線
８４０Ａ，８４０Ｂ，８４０Ｃ，８４０Ｄ　開口
８４１，８４２，８４３，８４４　切り欠き
８４５，８４６，８４７，８４８　窓
８４９　透光板
８５０　区画室
８５１，８５２　封鎖板
８５４，８５５　金属メッシュ
８６０　区画壁
９０１，９０２　ライトガイド
９０３　ヘッド板
９１０　プリズムユニット
９２１，９２２インテグレータレンズ

９２３　均一照明光学系
９２４　色分離光学系
９２５Ｒ，９２５Ｇ，９２５Ｂ　液晶ライトバルブ
９２７　導光系
９３１　反射ミラー
９４１　青緑反射ダイクロイックミラー
９４２　緑反射ダイクロイックミラー
９４３　反射ミラー
９４４　赤色光束Ｒの出射部
９４５　緑色光束Ｇの出射部
９４６　青色光束Ｂの出射部
９５１，９５２，９５３，９５４　集光レンズ
９７１　入射側反射ミラー
９７２　出射側反射ミラー
９７３　中間レンズ

【図１】



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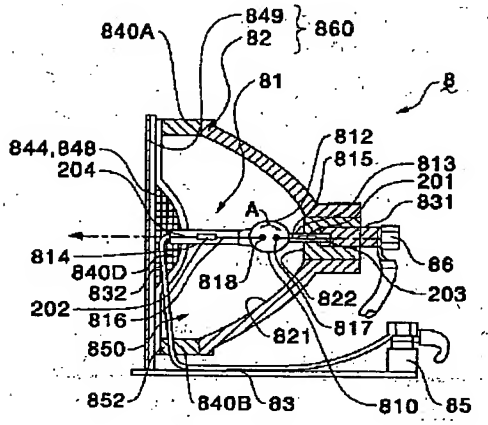

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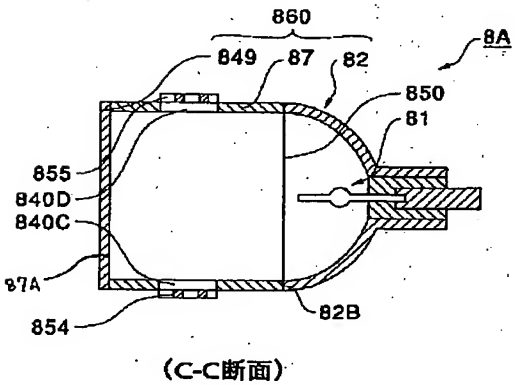

(C-C断面)

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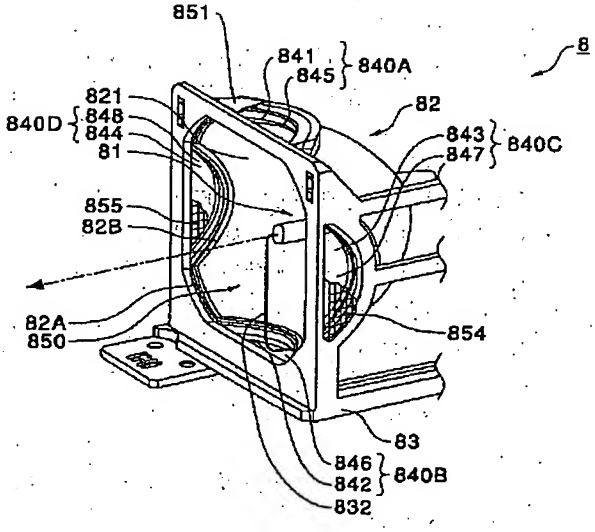

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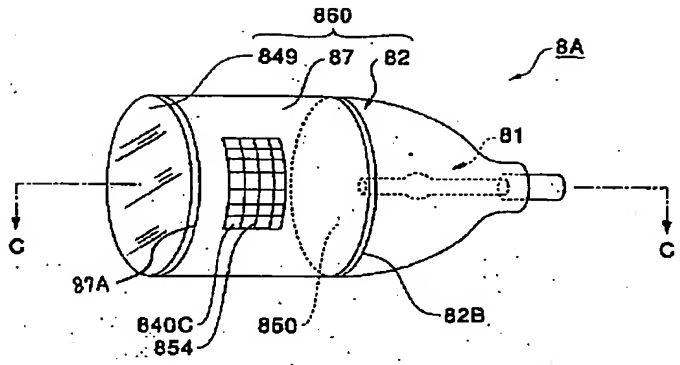

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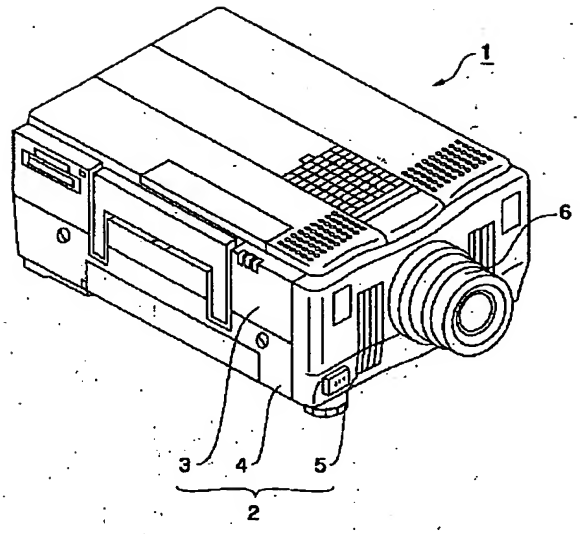

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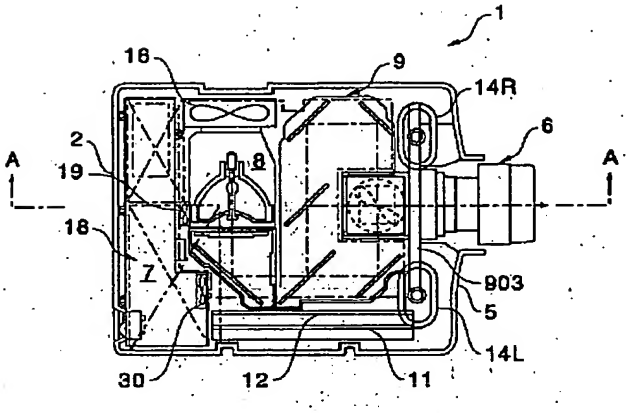

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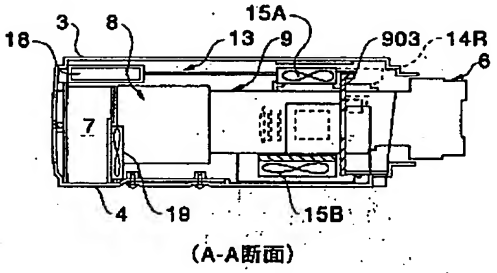

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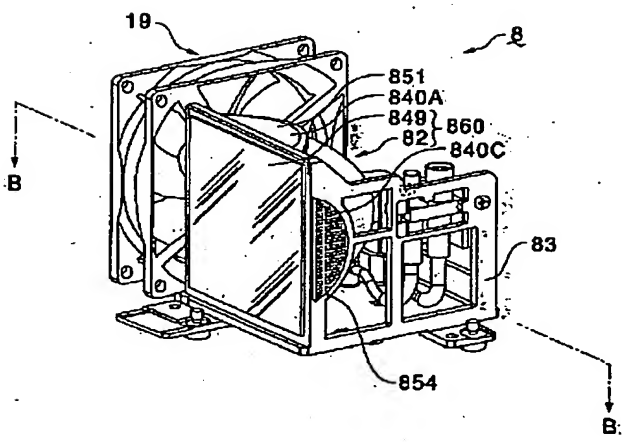

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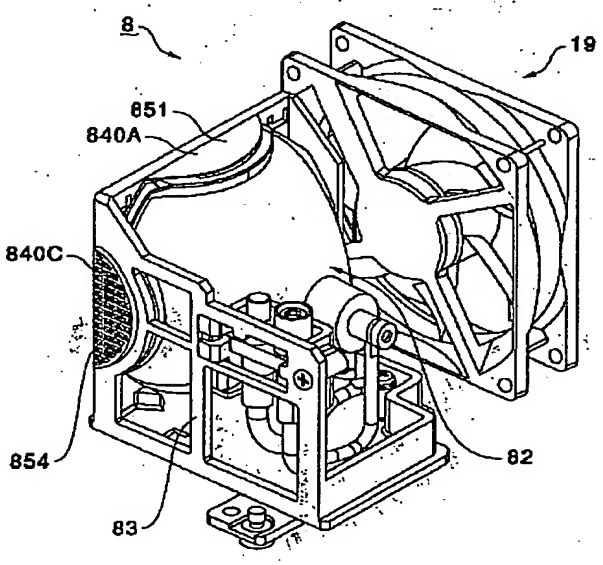

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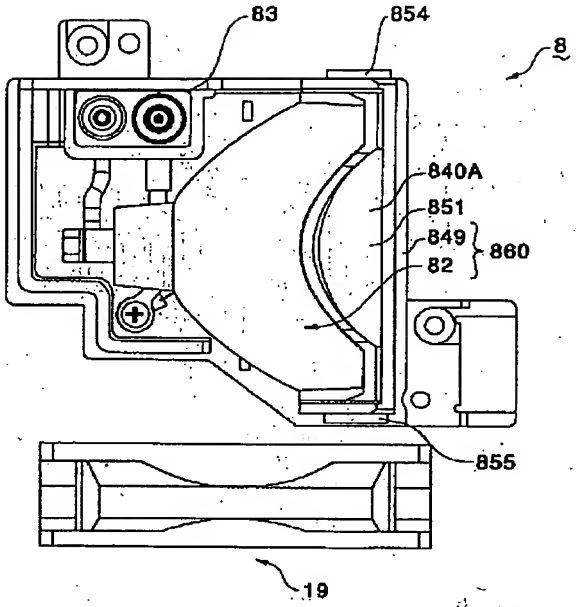

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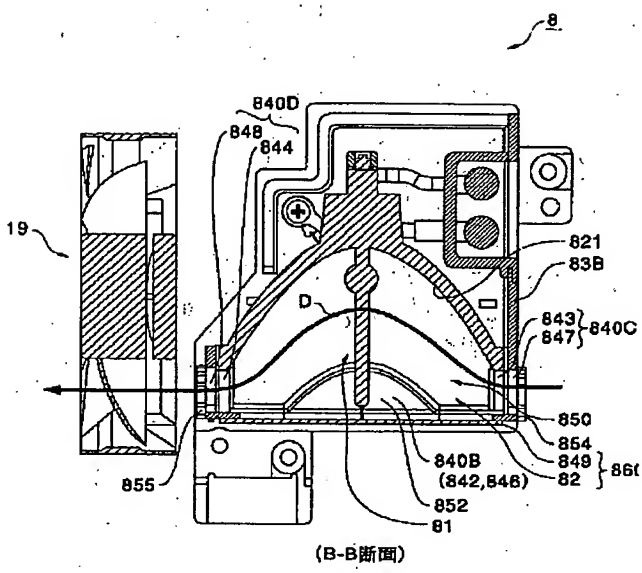

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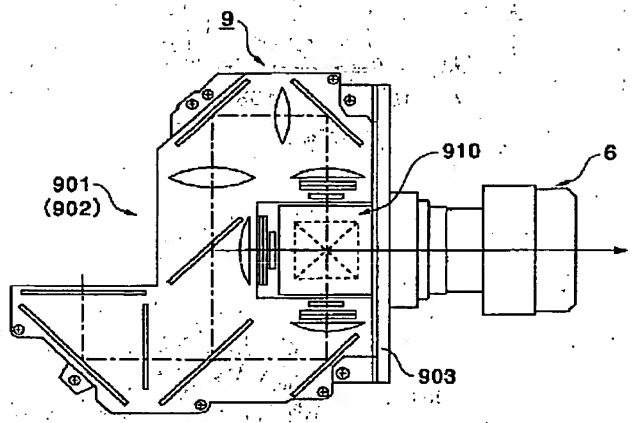

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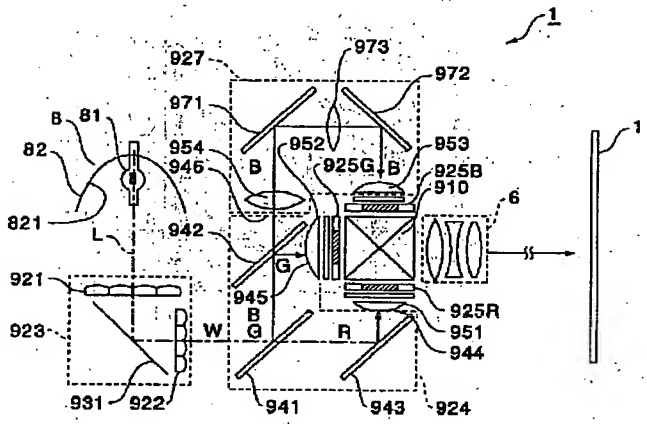

* NOTICES *

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3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] A lamp and the reflecting mirror which reflects the emission light from the lamp concerned and carries out outgoing radiation as an abbreviation parallel light, In the light equipment arranged in the compartment divided with the partition wall with which it has the translucent plate located in opening of the reflecting mirror concerned, and said lamp contains said reflecting mirror and said translucent plate at least It is light equipment which is equipped with at least one bleeder and characterized by the bleeder concerned being the structure which can check that the lamp fragment produced when said lamp explodes disperses outside in order that said partition wall may secure the aeration between said compartments and exteriors.
[Claim 2] It is light equipment characterized by being prepared in the part which said bleeder cut a part of opening edge which has specified said opening of said reflecting mirror in claim 1, and lacked.
[Claim 3] It is light equipment characterized by said bleeder being sieve opening structure in claims 1 or 2.
[Claim 4] It is light equipment characterized by equipping said translucent plate with an ultraviolet-rays electric shielding function in claim 1 thru/or either of 3.
[Claim 5] The projection mold display characterized by having a modulation means to perform the modulation corresponding to image information to the flux of light by which outgoing radiation is carried out to claim 1 thru/or which term of 4 from the light equipment of a publication, and the light equipment concerned.
[Claim 6] The projection mold display characterized by stationing the fan who supplies a cooling wind to said compartment in claim 5 on the outside of said bleeder.
[Claim 7] The projection mold display characterized by having a color separation means to divide into the colored light bundle of at least 2 colors the flux of light by which outgoing radiation is carried out to claim 1 thru/or which term of 4 from the light equipment of a publication, and the light equipment concerned, and a modulation means to perform the modulation corresponding to image information to the flux of light of each color separated by the color separation means concerned.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to light equipment equipped with lamps, such as a metal halide lamp suitable for using as the light source of a projection mold display. Moreover, this invention relates to the projection mold display with which this light equipment was incorporated.
[0002]
[Description of the Prior Art] Lamps, such as a metal halide lamp and a xenon lamp, are used as the light source of a projection mold display. Since it excels in luminous efficiency compared with the lamp of other formats, and it is long lasting and excels also in color rendering properties, especially the metal halide lamp is widely used as the light source of a projection mold display. Generally, such a lamp is used as light equipment of the unit format attached to the lamp housing with the reflecting mirror.
[0003] A lamp has the case which originates in the vapor pressure within luminescence increasing during lighting, and explodes, and may damage each part of an adjoining projection mold display with the fragment of the lamp which disperses at this time. In order to avoid such evil, translucent plates, such as a glass plate, block opening of a reflecting mirror, and the light equipment of a configuration of having arranged the lamp in the closed space divided with this translucent plate and reflecting mirror is indicated by JP,8-7841,A.
[0004]
[Problem(s) to be Solved by the Invention] Since an arc is formed during lighting inter-electrode [within luminescence], a lamp tends to become an elevated temperature. However, in the light equipment of the indication to JP,8-7841,A, since the lamp is arranged in the closed space divided with the translucent plate and the reflecting mirror, generation of heat of a lamp will make the inside of a closed space an elevated temperature. Consequently, a lamp tends to lapse into overheating. For example, as for the metal halide lamp arranged in a closed space, the temperature of a lamp may rise to about 1000 degrees C. If a lamp becomes an elevated temperature, a life becomes short, and moreover, it will deform and will become easy to explode. This will lead to the fall of the dependability of light equipment.
[0005] Then, the technical problem of this invention is in the light equipment of a configuration of that reflecting mirror opening was closed by the translucent plate so that a lamp fragment might not disperse outside to propose the light equipment which can prevent that a lamp lapses into overheating. Moreover, this invention is to propose the projection mold display which used this light equipment as the light source.
[0006]
[Means for Solving the Problem] In order to solve the above-mentioned technical problem, he is trying to reduce the thermal load of a lamp in this invention in the light equipment of a configuration of that the lamp has been arranged in the compartment divided with the partition wall which contains a reflecting mirror and a translucent plate at least by preparing the bleeder for securing the aeration of said compartment in a partition wall. Moreover, even if it devises the formation location and structure of a bleeder and a lamp explodes, it is made for the fragment of

a lamp to have not dispersed outside. Namely, the reflecting mirror which reflects the emission light from a lamp and the lamp concerned in this invention, and carries out outgoing radiation as an abbreviation parallel light, In the light equipment arranged in the compartment divided with the partition wall with which it has the translucent plate located in opening of the reflecting mirror concerned, and said lamp contains said reflecting mirror and said translucent plate at least In order to secure the aeration of said compartment and exterior to said partition wall, at least one bleeder is prepared and the bleeder concerned is characterized by being the structure which can check that the lamp fragment produced when said lamp explodes disperses outside.

[0007] In the light equipment of this invention, since the compartment and the exterior where the lamp has been arranged through a bleeder are open for free passage, a lamp is cooled by the airstream which flows out of the inside of a compartment outside. Since a lamp can prevent lapsing into overheating by this, a lamp can be kept long lasting, moreover, deformation of a lamp is prevented and the lamp burst resulting from this deformation can be prevented. Moreover, in this invention, even if it has prepared the bleeder, this bleeder has the structure where the lamp fragment produced when a lamp explodes does not disperse outside. Therefore, the evil which a lamp fragment originates in dispersing outside and generates is also avoidable.

[0008] In this invention, when a partition wall consists of a reflecting mirror and a translucent plate, it is desirable to prepare in the part which cut and lacked a part of opening edge which has specified said opening of said reflecting mirror for said bleeder. Since it is reflected with a reflecting mirror and outgoing radiation of the emission light from a lamp is carried out as an parallel light, if a bleeder is prepared in the part by which emission light is reflected, the evil of emission light being scattered about will arise. Since the bleeder is prepared in the part which hardly participates in reflection of emission light according to this invention, the above-mentioned evil is avoidable.

[0009] Moreover, a partition wall is constituted by a reflecting mirror, a side attachment wall, and the translucent plate, when distance is between a reflecting mirror and a translucent plate and the side attachment wall of a sheet metal etc. is installed in it between them. In this case, a bleeder may be prepared in a side attachment wall.

[0010] As structure of said bleeder, it can consider as sieve opening structures, such as a mesh. In this case, the bleeder of a direct mesh configuration may be formed in a reflecting mirror, and beforehand big opening is formed, and you may make it equip with the member which has sieve opening structures, such as a mesh and a mesh, afterwards in that opening.

[0011] Here, since the metal halide lamp is emitting a lot of ultraviolet rays at the time of lighting, it is desirable to give an ultraviolet-rays cutoff function to a translucent plate. Thus, with constituting, since emission of the ultraviolet rays from light equipment can be prevented, degradation of each part of the projection mold display by ultraviolet rays can be prevented.

[0012] The light equipment of this invention can be used as said light source of the projection mold display which has a modulation means to perform the modulation corresponding to image information to the flux of light by which outgoing radiation is carried out from light equipment. In this case, it is desirable to prepare the fan who supplies the cooling wind for cooling a lamp in a compartment in the outside of a bleeder established in the partition wall. The cooling wind supplied by this fan can raise the cooling effectiveness of a lamp.

[0013] Especially the light equipment of this invention is suitable for using as said light source of the projection mold display for a color picture display which has a color separation means to separate into the colored light bundle of at least 2 colors the flux of light by which outgoing radiation is carried out from the light source, and a modulation means to perform the modulation corresponding to image information to the flux of light of each color separated by the color separation means concerned.

[0014]

[Embodiment of the Invention]

(Light equipment) The light equipment which applied this invention to below with reference to the drawing is explained. The appearance at the time of seeing the light equipment of this example from the slanting upper part is shown in drawing 1 , and the outline cross-section configuration of light equipment is shown in drawing 2 . Moreover, a part of reflecting mirror and lamp housing

are taken out to drawing 3 , and it is shown in it.
[0015] As shown in these drawings, light equipment 8 is equipped with the lamp housing 83 made of resin in which a lamp 81, the reflecting mirror 82 with which this lamp 81 was attached, and this reflecting mirror 82 are attached.
[0016] Although the lamp 81 of this example is a metal halide lamp, it is also possible to use other lamps, such as a xenon lamp. The arc tube 810 of a lamp 81 is a product made from quartz glass, and the light-emitting part 812 currently formed in the center is carrying out elliptical [near] spherically. The electrode seal sections 813 and 814 are really formed in the both sides of this light-emitting part 812. In the interior of a light-emitting part 812, on the tube axis, the electrode arbors 815 and 816 by which the end face side was enclosed with the seal sections 813 and 814 set fixed spacing, and opposite arrangement is carried out. Moreover, the metal halogenide is enclosed with the interior of a light-emitting part 812. Metal halogenides are for example, an iodation dysprosium, iodation neodymium, and a cesium iodide. Furthermore, the argon as the mercury and the auxiliary gas for starting as a buffer gas is also enclosed with the light-emitting part 812 with the above-mentioned metal halogenide.
[0017] The electrodes 817 and 818 formed in the location which retreated slightly from each tip of the electrode arbors 815 and 816 located in the interior of a light-emitting part 812 by coiling a tungsten wire densely, respectively are arranged. The end face side of each electrode arbors 815 and 816 currently laid under the interior of the seal sections 813 and 814 is connected to the molybdenum wires 203 and 204 through the molybdenum foils 201 and 202, respectively. The other end side of these molybdenum wires 203 and 204 is connected to a mouthpiece 831 and the nickel lead wire 832, respectively.
[0018] In addition, the nickel lead wire 832 extended from one edge of a lamp 81 is taken about at the rear-face side of a reflecting mirror 82, and is connected to the terminal 85 for external connection, and the terminal 86 for external connection is attached also in the base side of the mouthpiece 831 located in the opposite side of a lamp 81.
[0019] The cross section is equipped with the parabolic reflector 821, reflects the emission light from a lamp 81 in this reflector 821, and the reflecting mirror 82 has come to be able to carry out outgoing radiation of it ahead as an abbreviation parallel light on the other hand. The lamp anchoring hole 822 is formed in the center of a pars basilaris ossis occipitalis of a reflector 821. The part of the mouthpiece 831 of the lamp of the above-mentioned configuration is inserted in this anchoring hole 822, and it is fixed by heat-resistant adhesives. The lamp 81 is attached in the reflecting mirror 82 so that a tube axis may become level at this mouthpiece 831, and it is in agreement with the medial-axis line of a reflector 821.
[0020] As for the lamp housing 83, the front face of the direction of optical outgoing radiation serves as opening. The particular glass translucent plate 849 equipped with the function which shades the transparency possibility of and ultraviolet rays for the emission light from the lamp 81 which was reflected in the front face equipped with this opening in the reflector 821 of a reflecting mirror 82, and was made into parallel light is arranged. Thus, opening 82A which is the front edge of the reflector 821 in a reflecting mirror 82 is blocked by the translucent plate 849, the partition wall 860 is constituted from this example by this translucent plate 849 and reflector 821, and the lamp 81 is arranged in the compartment 850 divided with this partition wall 860. In addition, as a translucent plate 849, it excels in thermal resistance and hard glass, such as Pyrex with high reinforcement, can be used. What is necessary is just to be able to bear the temperature of 150 degrees C - 200 degrees C as thermal resistance. Moreover, as for the thickness, it is desirable to be referred to as about 2-5mm. It is because it will become weak to the impact from the outside if thinner than 2mm, and possibility, such as breakage by thermal expansion, will become high if thicker than 5mm.
[0021] The bleeders 840C and 840D of the compartment 850 and the exterior where the lamp 81 has been arranged are formed in both sides, and a lamp 81 is cooled through these bleeders 840C and 840D by the reflecting mirror 82 which are some component parts of the partition wall 860 of this example.
[0022] If it explains in detail, in the reflecting mirror 82, the abbreviation hemicycle-like notching 841-844 is formed in opening marginal 82B which has specified the opening 82A at the upper and

lower sides and a total of four places of the method of both sides. On the other hand, it is formed in the upper and lower sides and right and left of a lamp housing 83 so that the apertures 845–848 of the shape of each notching 841–844 and abbreviation isomorphism prepared in the reflecting mirror 82 may lap with notching 841–844. The openings 840A–840D which each notching 841–844 and each apertures 845–848 overlap, and connect a compartment 850 and the exterior are formed. The up–and–down openings 840A and 840B are closed by the blockade plates 851 and 852 among these openings 840A–840D. On the other hand, the metal mesh 854 and 855 as a member which has sieve opening structure are inserted in the openings 840C and 840D of the remaining right and left, and it has become the bleeder which opens a compartment 850 and the exterior for free passage. That is, in this example, although opening 82A of a reflecting mirror 82 is closed by the translucent plate 849, the lamp 81 is not arranged in the sealed space and is arranged from the exterior in the compartment 850 which can supply a cooling wind. In addition, although the metal mesh 854 and 855 which constitutes a bleeder are fixed to Openings 840C and 840D by insertion in this example, you may fix by adhesion, joining, a screw bundle, etc. Moreover, plastics, such as PEEK, PPS, etc. which were equipped with a certain amount of thermal resistance (about 100–150 degrees C) besides a metal as an ingredient which constitutes a bleeder, fluorine fiber, nylon, polyester, etc. can be considered.

[0023] Thus, in the constituted light equipment 8 of this example, since an arc as shown by the arrow head A among the electrodes 817 and 818 inside an arc tube 810 at drawing 2 is formed for example, as for a lamp 81, temperature rises. However, in the light equipment 8 of this example, since the openings 840C and 840D which connect the compartment 850 where the lamp 81 has been arranged at JP,8–7841,A mentioned above unlike the light equipment of an indication, and the exterior are formed, with the air introduced into a compartment 850 from the exterior, a cooling operation works on a lamp 81 and a lamp 81 is cooled. Therefore, various evils produced when a lamp 81 will be in overheating especially the formation of a short life, and the burst of an arc tube are avoidable.

[0024] In the light equipment 8 of this example, the opening dimension of the metal mesh 854 and 855 inserted in each openings 840C and 840D, i.e., the dimension of a sieve opening, is set as extent which prevents a fragment from scattering [of the lamp produced when a lamp 81 explodes] outside. Therefore, even if it has formed Openings 840C and 840D, the fragment of a lamp 81 can prevent dispersing outside certainly. For this reason, for example, when light equipment 8 is used as the light source of a projection mold display, it can prevent being damaged with the glass fragment with which the component part of the projection mold display except light equipment 8 dispersed. In addition, as for the dimension of a sieve opening, it is desirable to consider as several microns – several mm. If this dimension is too large, it is because a small lamp fragment will scatter outside, resistance of a wind will become large on the other hand if this dimension is too small, and the function as a bleeder will be checked.

[0025] Moreover, in the light equipment 8 of this example, since it is reflected in the reflector 821 of a reflecting mirror 82 and outgoing radiation of the emission light from a lamp 81 is carried out toward the front as an parallel light, if the openings 840C and 840D in which a bleeder is formed are formed in the part by which emission light is reflected, the evil of emission light being scattered about will arise. In the light equipment 8 of this example, Openings 840C and 840D are formed by cutting and lacking a part of opening marginal 82B of a reflecting mirror 82. Since opening marginal 82B of this reflecting mirror 82 is a part which hardly participates in reflection of emission light, it can avoid the above–mentioned evil. In addition, although sieve opening structure is made into a mesh in this example, a configuration should just be the structure where receipts and payments of not only a mesh but air are not checked, and the piece of glass cannot disperse easily.

[0026] The special glass which can shade ultraviolet rays is used for the translucent plate 849 of this example. Although the metal halide lamp is emitting a lot of ultraviolet rays at the time of lighting, it can prevent that ultraviolet rays leak outside with this translucent plate 849. Therefore, if the light equipment 8 of this example is used as the light source of a projection mold display, it can prevent that the component part of the projection mold display except light equipment 8 deteriorates by ultraviolet rays. In addition, of course as a translucent plate 849

equipped with the function which shades ultraviolet rays, you may be the translucent plate of a configuration of having formed the vacuum evaporationo film of the ingredient which can cover ultraviolet rays to the usual glass substrate instead of using special glass. Moreover, when degradation of ultraviolet rays is not so remarkable, it is easy to be natural even if it uses the usual glass substrate.

[0027] In addition, although the openings 840A and 840B of the upper and lower sides of a reflecting mirror 82 are blocked in the light equipment 8 of this example, of course, the part of these openings 840A and 840B may be used as a bleeder. Aiso in this case, what is necessary is just to form sieve opening structures, such as a metal mesh, in each openings 840A and 840B so that the fragment of a lamp may not scatter outside.

[0028] Moreover, a fan is prepared in the outside of the openings 840C and 840D used as a bleeder, and you may make it supply a cooling wind to a compartment 850 by this fan so that drawing 9 – drawing 12 may be later mentioned to reference. In this case, the cooling wind supplied by the fan can raise the cooling effectiveness of a lamp 81.

[0029] Furthermore, it is also possible for it not to be necessary to constitute the partition wall 860, to establish a side attachment wall between a reflecting mirror 82 and a translucent plate 849, and to not necessarily constitute the partition wall 860 from these three bodies with a reflecting mirror 82 and a translucent plate 849, like this example. The appearance of the light equipment is shown in drawing 4 using the perspective view, and the outline configuration of the light equipment is shown in drawing 5 using the sectional view. In addition, in drawing 4 and drawing 5 , if attached to the part which has the function which is common in the above-mentioned light equipment 8, a same sign is attached and detailed explanation is omitted.

[0030] In light equipment 8A shown in drawing 4 and drawing 5 , the side plate member 87 formed from the sheet metal extended in the shape of a cylinder is attached in the direction of optical outgoing radiation to circular opening marginal 82B of the reflecting mirror 82 which carried out the parabola form. The translucent plate 849 is being fixed to opening 87A by the side of the direction of optical outgoing radiation of the side plate member 87. That is, the partition wall 860 is constituted from light equipment 8A of this example by three bodies, a reflecting mirror 82, a translucent plate 849, and the side plate member 87. The openings 840C and 840D used as the bleeder of the compartment 850 and the exterior which were divided with the partition wall 860 can be formed in the side plate member 87 which are some component parts of the partition wall 860, and a lamp 81 can be cooled now to it by the cooling wind supplied from the outside through the openings 840C and 840D used as these bleeders. Thus, also in light equipment 8A of this example, since a cooling operation works on a lamp 81 with the air introduced into a compartment 850 from the exterior, various evils produced when a lamp 81 will be in overheating are avoidable.

[0031] Moreover, in light equipment 8A of this example, the metal mesh 854 and 855 which has the opening configuration of extent which bars that the lamp fragment produced when a lamp 81 explodes to the openings 840C and 840D formed in the side plate member 87 scatters outside are inserted in. Therefore, also in light equipment 8A of this example, even if it has formed the openings 840C and 840D which secure aeration with the exterior, the fragment of a lamp 81 can prevent dispersing outside certainly. Thereby, when light equipment 8A is used as the light source of a projection mold display, it can prevent being damaged with the glass fragment with which the component part of the projection mold display except light equipment 8A dispersed.

[0032] (Projection mold display) The example of the projection mold display equipped with the light equipment 8 explained previously is explained. This projection mold display is the thing of the format which divides the white light bundle from light equipment 8 into red, green, and 3 blue colored light bundles, each of these colored light bundles are made equivalent to image information through the light valve which consists of liquid crystal panels, modulates them, re-compounds the modulation flux of light of each color after becoming irregular, and carries out an enlarged display on a screen through a projection lens.

[0033] The appearance of the projection mold display of this example is shown in drawing 6 . The projection mold display 1 of this example has the sheathing case 2 which carried out the rectangular parallelepiped configuration. Fundamentally, the sheathing case 2 consists of front

cases 5 where the front face of equipment is specified as the upper case 3 and the lower case 4. From the center of the front case 5, the part by the side of the tip of the projection lens unit 6 has projected.

[0034] Arrangement of each component in the interior of the sheathing case 2 of the projection mold display 1 is shown in drawing 7 , and the cross section in the A-A line of drawing 7 is shown in drawing 8 . As shown in these drawings, in the interior of the sheathing case 2, the power supply unit 7 is arranged at the back end side. The light equipment 8 which applied this invention is arranged in the location which adjoined the before [equipment] side rather than this. The inhalation-of-air fan 19 for cooling is stationed in the side location of this light equipment 8. In the projection mold display 1 of this example, when it becomes impossible by a life etc. to use the lamp 81 of light equipment 8, light equipment itself is detached, attached and exchanged. The optical unit 9 is arranged at the before [light equipment 8] side. The end face side of the projection lens unit 6 is located in the center by the side of before the optical unit 9. On the other hand, the interface substrate 11 with which the input/output interface circuit was carried in the side of the optical unit 9 towards the equipment cross direction is arranged, and the video substrate 12 in which the video signal processing circuit was carried is arranged in parallel with this. Furthermore, the control board 13 for equipment drive control is arranged at the light equipment 8 and optical unit 9 bottom. Loudspeakers 14R and 14L are arranged at the angle of right and left by the side of the equipment front end, respectively.

[0035] In the center by the side of the top face of the optical unit 9, inhalation-of-air fan 15A for cooling is arranged, and fan 15B for circulation for the circulating flow formation for cooling is arranged in the center by the side of the base of the optical unit 9. Moreover, the ventilating fan 16 is arranged in the equipment side face which is the rear-face side of light equipment 8. And the auxiliary cooling fan 17 for attracting the airstream for cooling from inhalation-of-air fan 15A in a power supply unit 7 is arranged in the location facing the edge of the substrates 11 and 12 in a power supply unit 7.

[0036] Furthermore, the floppy disk drive unit (FDD) 18 is arranged in the location on the left-hand side of [the] equipment right above [of a power supply unit 7].

[0037] Light equipment 8 and the inhalation-of-air fan 19 are taken out to drawing 9 and drawing 10 , and it is shown in them using the perspective view. Moreover, light equipment 8 and the inhalation-of-air fan 19 are taken out to drawing 11 , and it is shown in it using the top view. Furthermore, the cross section in the B-B line of drawing 9 is shown in drawing 12 . As shown in these drawings, the inhalation-of-air fan 19 is stationed in the location which adjoins outside opening 840D which becomes light equipment 8 built into the projection mold display 1 with a bleeder. Therefore, of this inhalation-of-air fan 19, it sees in the compartment 850 of light equipment 8 superficially, and the airstream for cooling as shown in drawing 12 by the arrow head D is formed in it. For this reason, since air circulation of a compartment 850 is promoted compared with the case where the inhalation-of-air fan 19 is not stationed, the cooling effectiveness of a lamp 81 improves.

[0038] The parts of the light source unit 9 and the projection lens unit 6 are taken out in drawing 13 , and it is shown in it. As shown in this drawing, the optical unit 9 has the composition that optical elements other than prism unit 910 which constitutes that color composition means were pinched and held from the upper and lower sides among the up-and-down light guides 901 and 902. The upper light guide 901 of these and the bottom light guide 902 are being fixed to the upper case 3 and lower case 4 side by the lockscrew, respectively. Moreover, the light guide plates 901 and 902 of these upper and lower sides are being fixed by the lockscrew as well as the prism unit 910 side. The prism unit 910 is being fixed to the rear face of the thick head plate 903 which is a dies casting plate by the lockscrew. Similarly the end face side of the projection lens unit 6 is being fixed to the front face of this head plate 903 by the lockscrew.

[0039] The outline configuration of the optical system included in the projection mold display 1 is shown in drawing 14 . The optical system of this example is equipped with the lamp 81 which is the component of the above-mentioned light equipment 8, and the homogeneity illumination-light study system 923 which consists of the integrator lenses 921 and the integrator lenses 922 which are a homogeneity illumination-light study component. Moreover, the color separation

optical system 924 which separates into red, green, and each blue colored light bundles R, G, and B the white light bundle W by which outgoing radiation is carried out from the homogeneity illumination-light study system 923, The liquid crystal light valves 925R, 925G, and 925B of three sheets as a light valve which modulates each colored light bundle, It has the prism unit 910 as color composition optical system which re-compounds the modulated colored light bundle, and the projection lens unit 6 which carries out expansion projection of the compounded flux of light on the front face of a screen 10. Furthermore, it has the light guide system 927 which leads the blue glow bundle B to corresponding liquid crystal bulb 925B among each colored light bundle separated according to the color separation optical system 924.

[0040] The homogeneity illumination-light study system 923 is equipped with the reflective mirror 931, and it turns the main optical axis L of the outgoing radiation light from an illumination-light study system to equipment front, and he is trying to bend it at a right angle. This mirror 931 is pinched and it is arranged at the condition that the integrator lenses 921 and 922 intersect perpendicularly.

[0041] The outgoing radiation light from a lamp 81 will be projected as secondary light source images, respectively on the plane of incidence of each lens which constitutes the integrator lens 922 through this integrator lens 921, and an illuminated object will be irradiated using outgoing radiation light from the integrator lens 922 concerned.

[0042] Each color separation optical system 924 consists of a bluish green reflective dichroic mirror 941, a green reflective dichroic mirror 942, and a reflective mirror 943. In the bluish green reflective dichroic mirror 941, the blue glow bundle B included there and the green light bundle G are first reflected by the right angle, and the white light bundle W goes to the green reflective dichroic mirror 942 side.

[0043] This mirror 941 is passed, it is reflected by the right angle by the back reflective mirror 943, and outgoing radiation of the red flux of light R is carried out to the prism unit 910 side from the outgoing radiation section 944 of the red flux of light R. In the green reflective dichroic mirror 942, the green light bundle G is reflected by the right angle, and outgoing radiation of the blue and the green flux of lights B and G which were reflected in the mirror 941 is carried out to a color composition optical-system side from the outgoing radiation section 945 of the green light bundle G. Outgoing radiation of the blue glow bundle B which passed this mirror 942 is carried out to the light guide system 927 side from the outgoing radiation section 946 of the blue glow bundle B. In this example, it is set up so that all the distance from the outgoing radiation section of the white light bundle W of a homogeneity illumination-light study component to the outgoing radiation sections 944, 945, and 946 of each colored light bundle in the color separation optical system 924 may become equal.

[0044] Condenser lenses 951 and 952 are arranged at the outgoing radiation side of the red of the color separation optical system 942, and the outgoing radiation sections 944 and 945 of the green light bundles R and G, respectively. Therefore, incidence of the red and the green light bundles R and G which carried out outgoing radiation from each outgoing radiation section is carried out to these condenser lenses 951 and 952, and they are made parallel.

[0045] Thus, incidence of the red and the green light bundles R and G which were made parallel is carried out to the liquid crystal light valves 925R and 925G, they are modulated, and the image information corresponding to each colored light is added. That is, according to image information, switching control of these light valves is carried out by the non-illustrated driving means, and, thereby, the modulation of each colored light which passes through this is performed. Such a driving means can use a well-known means as it is. On the other hand, the blue glow bundle B is led to liquid crystal light valve 925B which corresponds through the light guide system 927, and a modulation is similarly performed in here according to image information. Poly-Si TFT can be used for the light valve of this example as a switching element.

[0046] The light guide system 927 consists of a middle lens 973 arranged between the condenser lens 954 arranged to the outgoing radiation side of the outgoing radiation section 946 of the blue glow bundle B, the incidence side reflective mirror 971, the outgoing radiation side reflective mirrors 972, and these mirrors, and a condenser lens 953 arranged to the near side of liquid crystal light valve 925B. The blue glow bundle B becomes the longest, therefore the quantity of

light loss of this flux of light of distance from the optical path length 805, i.e., the light source lamp, of each colored light bundle to each liquid crystal panel increases most. However, quantity of light loss can be controlled by making the light guide system 927 intervene. Therefore, the optical path length of each colored light bundle can be substantially made into equivalence.
[0047] Next, incidence of each colored light bundle modulated through each liquid crystal panel 925R, and G and B is carried out to the color composition optical system 910, and it is re-compounded here. Color composition optical system consists of these examples using the prism unit 910 which consists of a dichroic prism as mentioned above. Here, expansion projection of the re-compounded color image is carried out on the front face of the screen 10 which is in a position through the projection lens unit 6.
[0048] Thus, in the constituted projection mold display 1, it has light equipment 8 which applied this invention as the light source. This light equipment 8 cools a lamp 81, as mentioned above, and even if a lamp 81 explodes, it is made for a lamp fragment to have not scattered to the exterior of light equipment 8 further. Therefore, the component part of the projection mold display 1 except light equipment 8 is not damaged with a lamp fragment, and, moreover, a life of a lamp can realize a long projection mold display.
[0049]
[Effect of the Invention] He is trying to reduce the thermal load of a lamp by preparing the bleeder for securing the aeration between the compartments and the exteriors where the lamp has been arranged in a partition wall in the projection mold display equipped with the light equipment and this light equipment of this invention, as explained above. Moreover, even if it devises the opening configuration of a bleeder and a lamp explodes, it is made not to be scattered outside in the fragment of a lamp. Therefore, since the air circulation in a compartment is secured, a lamp can be cooled and a lamp can be kept long lasting. Moreover, deformation of a lamp can be prevented and the burst of the lamp resulting from this deformation can be prevented.
[0050] Moreover, if it forms by cutting and lacking a part of opening edge which has specified opening of a reflecting mirror for the bleeder, the fault of emission light being scattered about is avoidable.
[0051] Furthermore, if the function which can cover ultraviolet rays is given to a translucent plate, it can avoid leaking outside the ultraviolet rays emitted from a lamp. Thereby, degradation of the component part of optical instruments, such as a projection mold display with which light equipment was incorporated, can be prevented.
[0052] Furthermore, if the fan who supplies a cooling wind in a compartment is prepared in the outside of a bleeder established in the partition wall again, a lamp can be cooled efficiently.

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[Field of the Invention] This invention relates to light equipment equipped with lamps, such as a metal halide lamp suitable for using as the light source of a projection mold display. Moreover, this invention relates to the projection mold display with which this light equipment was incorporated.

[Translation done.]

PRIOR ART

[Description of the Prior Art] Lamps, such as a metal halide lamp and a xenon lamp, are used as the light source of a projection mold display. Since it excels in luminous efficiency compared with the lamp of other formats, and it is long lasting and excels also in color rendering properties, especially the metal halide lamp is widely used as the light source of a projection mold display. Generally, such a lamp is used as light equipment of the unit format attached to the lamp housing with the reflecting mirror.
[0003] A lamp has the case which originates in the vapor pressure within luminescence increasing during lighting, and explodes, and may damage each part of an adjoining projection mold display with the fragment of the lamp which disperses at this time. In order to avoid such evil, translucent plates, such as a glass plate, block opening of a reflecting mirror, and the light equipment of a configuration of having arranged the lamp in the closed space divided with this translucent plate and reflecting mirror is indicated by JP,8-7841,A.

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EFFECT OF THE INVENTION

[Effect of the Invention] He is trying to reduce the thermal load of a lamp by preparing the bleeder for securing the aeration between the compartments and the exteriors where the lamp has been arranged in a partition wall in the projection mold display equipped with the light equipment and this light equipment of this invention, as explained above. Moreover, even if it devises the opening configuration of a bleeder and a lamp explodes, it is made not to be scattered outside in the fragment of a lamp. Therefore, since the air circulation in a compartment is secured, a lamp can be cooled and a lamp can be kept long lasting. Moreover, deformation of a lamp can be prevented and the burst of the lamp resulting from this deformation can be prevented.
[0050] Moreover, if it forms by cutting and lacking a part of opening edge which has specified opening of a reflecting mirror for the bleeder, the fault of emission light being scattered about is avoidable.
[0051] Furthermore, if the function which can cover ultraviolet rays is given to a translucent plate, it can avoid leaking outside the ultraviolet rays emitted from a lamp. Thereby, degradation of the component part of optical instruments, such as a projection mold display with which light equipment was incorporated, can be prevented.
[0052] Furthermore, if the fan who supplies a cooling wind in a compartment is prepared in the outside of a bleeder established in the partition wall again, a lamp can be cooled efficiently.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Since an arc is formed during lighting inter-electrode [within luminescence], a lamp tends to become an elevated temperature. However, in the light equipment of the indication to JP,8-7841,A, since the lamp is arranged in the closed space divided with the translucent plate and the reflecting mirror, generation of heat of a lamp will make the inside of a closed space an elevated temperature. Consequently, a lamp tends to lapse into overheating. For example, as for the metal halide lamp arranged in a closed space, the temperature of a lamp may rise to about 1000 degrees C. If a lamp becomes an elevated temperature, a life becomes short, and moreover, it will deform and will become easy to explode. This will lead to the fall of the dependability of light equipment.
[0005] Then, the technical problem of this invention is in the light equipment of a configuration of that reflecting mirror opening was closed by the translucent plate so that a lamp fragment might not disperse outside to propose the light equipment which can prevent that a lamp lapses into overheating. Moreover, this invention is to propose the projection mold display which used this light equipment as the light source.

[Translation done.]

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MEANS

[Means for Solving the Problem] In order to solve the above-mentioned technical problem, he is trying to reduce the thermal load of a lamp in this invention in the light equipment of a configuration of that the lamp has been arranged in the compartment divided with the partition wall which contains a reflecting mirror and a translucent plate at least by preparing the bleeder for securing the aeration of said compartment in a partition wall. Moreover, even if it devises the formation location and structure of a bleeder and a lamp explodes, it is made for the fragment of a lamp to have not dispersed outside. Namely, the reflecting mirror which reflects the emission light from a lamp and the lamp concerned in this invention, and carries out outgoing radiation as an abbreviation parallel light, In the light equipment arranged in the compartment divided with the partition wall with which it has the translucent plate located in opening of the reflecting mirror concerned, and said lamp contains said reflecting mirror and said translucent plate at least In order to secure the aeration of said compartment and exterior to said partition wall, at least one bleeder is prepared and the bleeder concerned is characterized by being the structure which can check that the lamp fragment produced when said lamp explodes disperses outside.
[0007] In the light equipment of this invention, since the compartment and the exterior where the lamp has been arranged through a bleeder are open for free passage, a lamp is cooled by the airstream which flows out of the inside of a compartment outside. Since a lamp can prevent lapsing into overheating by this, a lamp can be kept long lasting, moreover, deformation of a lamp is prevented and the lamp burst resulting from this deformation can be prevented. Moreover, in this invention, even if it has prepared the bleeder, this bleeder has the structure where the lamp fragment produced when a lamp explodes does not disperse outside. Therefore, the evil which a lamp fragment originates in dispersing outside and generates is also avoidable.
[0008] In this invention, when a partition wall consists of a reflecting mirror and a translucent plate, it is desirable to prepare in the part which cut and lacked a part of opening edge which has specified said opening of said reflecting mirror for said bleeder. Since it is reflected with a reflecting mirror and outgoing radiation of the emission light from a lamp is carried out as an parallel light, if a bleeder is prepared in the part by which emission light is reflected, the evil of emission light being scattered about will arise. Since the bleeder is prepared in the part which hardly participates in reflection of emission light according to this invention, the above-mentioned evil is avoidable.
[0009] Moreover, a partition wall is constituted by a reflecting mirror, a side attachment wall, and the translucent plate, when distance is between a reflecting mirror and a translucent plate and the side attachment wall of a sheet metal etc. is installed in it between them. In this case, a bleeder may be prepared in a side attachment wall.
[0010] As structure of said bleeder, it can consider as sieve opening structures, such as a mesh. In this case, the bleeder of a direct mesh configuration may be formed in a reflecting mirror, and beforehand big opening is formed, and you may make it equip with the member which has sieve opening structures, such as a mesh and a mesh, afterwards in that opening.
[0011] Here, since the metal halide lamp is emitting a lot of ultraviolet rays at the time of lighting, it is desirable to give an ultraviolet-rays cutoff function to a translucent plate. Thus, with constituting, since emission of the ultraviolet rays from light equipment can be prevented,

degradation of each part of the projection mold display by ultraviolet rays can be prevented.
[0012] The light equipment of this invention can be used as said light source of the projection mold display which has a modulation means to perform the modulation corresponding to image information to the flux of light by which outgoing radiation is carried out from light equipment. In this case, it is desirable to prepare the fan who supplies the cooling wind for cooling a lamp in a compartment in the outside of a bleeder established in the partition wall. The cooling wind supplied by this fan can raise the cooling effectiveness of a lamp.
[0013] Especially the light equipment of this invention is suitable for using as said light source of the projection mold display for a color picture display which has a color separation means to separate into the colored light bundle of at least 2 colors the flux of light by which outgoing radiation is carried out from the light source, and a modulation means to perform the modulation corresponding to image information to the flux of light of each color separated by the color separation means concerned.
[0014]
[Embodiment of the Invention]
(Light equipment) The light equipment which applied this invention to below with reference to the drawing is explained. The appearance at the time of seeing the light equipment of this example from the slanting upper part is shown in drawing 1 , and the outline cross-section configuration of light equipment is shown in drawing 2 . Moreover, a part of reflecting mirror and lamp housing are taken out to drawing 3 , and it is shown in it.
[0015] As shown in these drawings, light equipment 8 is equipped with the lamp housing 83 made of resin in which a lamp 81, the reflecting mirror 82 with which this lamp 81 was attached, and this reflecting mirror 82 are attached.
[0016] Although the lamp 81 of this example is a metal halide lamp, it is also possible to use other lamps, such as a xenon lamp. The arc tube 810 of a lamp 81 is a product made from quartz glass, and the light-emitting part 812 currently formed in the center is carrying out elliptical [near] spherically. The electrode seal sections 813 and 814 are really formed in the both sides of this light-emitting part 812. In the interior of a light-emitting part 812, on the tube axis, the electrode arbors 815 and 816 by which the end face side was enclosed with the seal sections 813 and 814 set fixed spacing, and opposite arrangement is carried out. Moreover, the metal halogenide is enclosed with the interior of a light-emitting part 812. Metal halogenides are for example, an iodation dysprosium, iodation neodymium, and a cesium iodide. Furthermore, the argon as the mercury and the auxiliary gas for starting as a buffer gas is also enclosed with the light-emitting part 812 with the above-mentioned metal halogenide.
[0017] The electrodes 817 and 818 formed in the location which retreated slightly from each tip of the electrode arbors 815 and 816 located in the interior of a light-emitting part 812 by coiling a tungsten wire densely, respectively are arranged. The end face side of each electrode arbors 815 and 816 currently laid under the interior of the seal sections 813 and 814 is connected to the molybdenum wires 203 and 204 through the molybdenum foils 201 and 202, respectively. The other end side of these molybdenum wires 203 and 204 is connected to a mouthpiece 831 and the nickel lead wire 832, respectively.
[0018] In addition, the nickel lead wire 832 extended from one edge of a lamp 81 is taken about at the rear-face side of a reflecting mirror 82, and is connected to the terminal 85 for external connection, and the terminal 86 for external connection is attached also in the base side of the mouthpiece 831 located in the opposite side of a lamp 81.
[0019] The cross section is equipped with the parabolic reflector 821, reflects the emission light from a lamp 81 in this reflector 821, and the reflecting mirror 82 has come to be able to carry out outgoing radiation of it ahead as an abbreviation parallel light on the other hand. The lamp anchoring hole 822 is formed in the center of a pars basilaris ossis occipitalis of a reflector 821. The part of the mouthpiece 831 of the lamp of the above-mentioned configuration is inserted in this anchoring hole 822, and it is fixed by heat-resistant adhesives. The lamp 81 is attached in the reflecting mirror 82 so that a tube axis may become level at this mouthpiece 831, and it is in agreement with the medial-axis line of a reflector 821.
[0020] As for the lamp housing 83, the front face of the direction of optical outgoing radiation

serves as opening. The particular glass translucent plate 849 equipped with the function which shades the transparency possibility of and ultraviolet rays for the emission light from the lamp 81 which was reflected in the front face equipped with this opening in the reflector 821 of a reflecting mirror 82, and was made into parallel light is arranged. Thus, opening 82A which is the front edge of the reflector 821 in a reflecting mirror 82 is blocked by the translucent plate 849, the partition wall 860 is constituted from this example by this translucent plate 849 and reflector 821, and the lamp 81 is arranged in the compartment 850 divided with this partition wall 860. In addition, as a translucent plate 849, it excels in thermal resistance and hard glass, such as Pyrex with high reinforcement, can be used. What is necessary is just to be able to bear the temperature of 150 degrees C - 200 degrees C as thermal resistance. Moreover, as for the thickness, it is desirable to be referred to as about 2-5mm. It is because it will become weak to the impact from the outside if thinner than 2mm, and possibility, such as breakage by thermal expansion, will become high if thicker than 5mm.

[0021] The bleeders 840C and 840D of the compartment 850 and the exterior where the lamp 81 has been arranged are formed in both sides, and a lamp 81 is cooled through these bleeders 840C and 840D by the reflecting mirror 82 which are some component parts of the partition wall 860 of this example.

[0022] If it explains in detail, in the reflecting mirror 82, the abbreviation hemicycle-like notching 841-844 is formed in opening marginal 82B which has specified the opening 82A at the upper and lower sides and a total of four places of the method of both sides. On the other hand, it is formed in the upper and lower sides and right and left of a lamp housing 83 so that the apertures 845-848 of the shape of each notching 841-844 and abbreviation isomorphism prepared in the reflecting mirror 82 may lap with notching 841-844. The openings 840A-840D which each notching 841-844 and each apertures 845-848 overlap, and connect a compartment 850 and the exterior are formed. The up-and-down openings 840A and 840B are closed by the blockade plates 851 and 852 among these openings 840A-840D. On the other hand, the metal mesh 854 and 855 as a member which has sieve opening structure are inserted in the openings 840C and 840D of the remaining right and left, and it has become the bleeder which opens a compartment 850 and the exterior for free passage. That is, in this example, although opening 82A of a reflecting mirror 82 is closed by the translucent plate 849, the lamp 81 is not arranged in the sealed space and is arranged from the exterior in the compartment 850 which can supply a cooling wind. In addition, although the metal mesh 854 and 855 which constitutes a bleeder are fixed to Openings 840C and 840D by insertion in this example, you may fix by adhesion, joining, a screw bundle, etc. Moreover, plastics, such as PEEK, PPS, etc. which were equipped with a certain amount of thermal resistance (about 100-150 degrees C) besides a metal as an ingredient which constitutes a bleeder, fluorine fiber, nylon, polyester, etc. can be considered.

[0023] Thus, in the constituted light equipment 8 of this example, since an arc as shown by the arrow head A among the electrodes 817 and 818 inside an arc tube 810 at drawing 2 is formed for example, as for a lamp 81, temperature rises. However, in the light equipment 8 of this example, since the openings 840C and 840D which connect the compartment 850 where the lamp 81 has been arranged at JP,8-7841,A mentioned above unlike the light equipment of an indication, and the exterior are formed, with the air introduced into a compartment 850 from the exterior, a cooling operation works on a lamp 81 and a lamp 81 is cooled. Therefore, various evils produced when a lamp 81 will be in overheating especially the formation of a short life, and the burst of an arc tube are avoidable.

[0024] In the light equipment 8 of this example, the opening dimension of the metal mesh 854 and 855 inserted in each openings 840C and 840D, i.e., the dimension of a sieve opening, is set as extent which prevents a fragment from scattering [of the lamp produced when a lamp 81 explodes] outside. Therefore, even if it has formed Openings 840C and 840D, the fragment of a lamp 81 can prevent dispersing outside certainly. For this reason, for example, when light equipment 8 is used as the light source of a projection mold display, it can prevent being damaged with the glass fragment with which the component part of the projection mold display except light equipment 8 dispersed. In addition, as for the dimension of a sieve opening, it is desirable to consider as several microns - several mm. If this dimension is too large, it is

because a small lamp fragment will scatter outside, resistance of a wind will become large on the other hand if this dimension is too small, and the function as a bleeder will be checked.
[0025] Moreover, in the light equipment 8 of this example, since it is reflected in the reflector 821 of a reflecting mirror 82 and outgoing radiation of the emission light from a lamp 81 is carried out toward the front as an parallel light, if the openings 840C and 840D in which a bleeder is formed are formed in the part by which emission light is reflected, the evil of emission light being scattered about will arise. In the light equipment 8 of this example, Openings 840C and 840D are formed by cutting and lacking a part of opening marginal 82B of a reflecting mirror 82. Since opening marginal 82B of this reflecting mirror 82 is a part which hardly participates in reflection of emission light, it can avoid the above-mentioned evil. In addition, although sieve opening structure is made into a mesh in this example, a configuration should just be the structure where receipts and payments of not only a mesh but air are not checked, and the piece of glass cannot disperse easily.
[0026] The special glass which can shade ultraviolet rays is used for the translucent plate 849 of this example. Although the metal halide lamp is emitting a lot of ultraviolet rays at the time of lighting, it can prevent that ultraviolet rays leak outside with this translucent plate 849. Therefore, if the light equipment 8 of this example is used as the light source of a projection mold display, it can prevent that the component part of the projection mold display except light equipment 8 deteriorates by ultraviolet rays. In addition, of course as a translucent plate 849 equipped with the function which shades ultraviolet rays, you may be the translucent plate of a configuration of having formed the vacuum evaporationo film of the ingredient which can cover ultraviolet rays to the usual glass substrate instead of using special glass. Moreover, when degradation of ultraviolet rays is not so remarkable, it is easy to be natural even if it uses the usual glass substrate.
[0027] In addition, although the openings 840A and 840B of the upper and lower sides of a reflecting mirror 82 are blocked in the light equipment 8 of this example, of course, the part of these openings 840A and 840B may be used as a bleeder. Also in this case, what is necessary is just to form sieve opening structures, such as a metal mesh, in each openings 840A and 840B so that the fragment of a lamp may not scatter outside.
[0028] Moreover, a fan is prepared in the outside of the openings 840C and 840D used as a bleeder, and you may make it supply a cooling wind to a compartment 850 by this fan so that drawing 9 - drawing 12 may be later mentioned to reference. In this case, the cooling wind supplied by the fan can raise the cooling effectiveness of a lamp 81.
[0029] Furthermore, it is also possible for it not to be necessary to constitute the partition wall 860, to establish a side attachment wall between a reflecting mirror 82 and a translucent plate 849, and to not necessarily constitute the partition wall 860 from these three bodies with a reflecting mirror 82 and a translucent plate 849, like this example. The appearance of the light equipment is shown in drawing 4 using the perspective view, and the outline configuration of the light equipment is shown in drawing 5 using the sectional view. In addition, in drawing 4 and drawing 5 , if attached to the part which has the function which is common in the above-mentioned light equipment 8, a same sign is attached and detailed explanation is omitted.
[0030] In light equipment 8A shown in drawing 4 and drawing 5 , the side plate member 87 formed from the sheet metal extended in the shape of a cylinder is attached in the direction of optical outgoing radiation to circular opening marginal 82B of the reflecting mirror 82 which carried out the parabola form. The translucent plate 849 is being fixed to opening 87A by the side of the direction of optical outgoing radiation of the side plate member 87. That is, the partition wall 860 is constituted from light equipment 8A of this example by three bodies, a reflecting mirror 82, a translucent plate 849, and the side plate member 87. The openings 840C and 840D used as the bleeder of the compartment 850 and the exterior which were divided with the partition wall 860 can be formed in the side plate member 87 which are some component parts of the partition wall 860, and a lamp 81 can be cooled now to it by the cooling wind supplied from the outside through the openings 840C and 840D used as these bleeders. Thus, also in light equipment 8A of this example, since a cooling operation works on a lamp 81 with the air introduced into a compartment 850 from the exterior, various evils produced when a lamp 81

will be in overheating are avoidable.
[0031] Moreover, in light equipment 8A of this example, the metal mesh 854 and 855 which has the opening configuration of extent which bars that the lamp fragment produced when a lamp 81 explodes to the openings 840C and 840D formed in the side plate member 87 scatters outside are inserted in. Therefore, also in light equipment 8A of this example, even if it has formed the openings 840C and 840D which secure aeration with the exterior, the fragment of a lamp 81 can prevent dispersing outside certainly. Thereby, when light equipment 8A is used as the light source of a projection mold display, it can prevent being damaged with the glass fragment with which the component part of the projection mold display except light equipment 8A dispersed.
[0032] (Projection mold display) The example of the projection mold display equipped with the light equipment 8 explained previously is explained. This projection mold display is the thing of the format which divides the white light bundle from light equipment 8 into red, green, and 3 blue colored light bundles, each of these colored light bundles are made equivalent to image information through the light valve which consists of liquid crystal panels, modulates them, re-compounds the modulation flux of light of each color after becoming irregular, and carries out an enlarged display on a screen through a projection lens.
[0033] The appearance of the projection mold display of this example is shown in drawing 6 . The projection mold display 1 of this example has the sheathing case 2 which carried out the rectangular parallelepiped configuration. Fundamentally, the sheathing case 2 consists of front cases 5 where the front face of equipment is specified as the upper case 3 and the lower case 4. From the center of the front case 5, the part by the side of the tip of the projection lens unit 6 has projected.
[0034] Arrangement of each component in the interior of the sheathing case 2 of the projection mold display 1 is shown in drawing 7 , and the cross section in the A-A line of drawing 7 is shown in drawing 8 . As shown in these drawings, in the interior of the sheathing case 2, the power supply unit 7 is arranged at the back end side. The light equipment 8 which applied this invention is arranged in the location which adjoined the before [equipment] side rather than this. The inhalation-of-air fan 19 for cooling is stationed in the side location of this light equipment 8. In the projection mold display 1 of this example, when it becomes impossible by a life etc. to use the lamp 81 of light equipment 8, light equipment itself is detached, attached and exchanged. The optical unit 9 is arranged at the before [light equipment 8] side. The end face side of the projection lens unit 6 is located in the center by the side of before the optical unit 9. On the other hand, the interface substrate 11 with which the input/output interface circuit was carried in the side of the optical unit 9 towards the equipment cross direction is arranged, and the video substrate 12 in which the video signal processing circuit was carried is arranged in parallel with this. Furthermore, the control board 13 for equipment drive control is arranged at the light equipment 8 and optical unit 9 bottom. Loudspeakers 14R and 14L are arranged at the angle of right and left by the side of the equipment front end, respectively.
[0035] In the center by the side of the top face of the optical unit 9, inhalation-of-air fan 15A for cooling is arranged, and fan 15B for circulation for the circulating flow formation for cooling is arranged in the center by the side of the base of the optical unit 9. Moreover, the ventilating fan 16 is arranged in the equipment side face which is the rear-face side of light equipment 8. And the auxiliary cooling fan 17 for attracting the airstream for cooling from inhalation-of-air fan 15A in a power supply unit 7 is arranged in the location facing the edge of the substrates 11 and 12 in a power supply unit 7.
[0036] Furthermore, the floppy disk drive unit (FDD) 18 is arranged in the location on the left-hand side of [the] equipment right above [of a power supply unit 7].
[0037] Light equipment 8 and the inhalation-of-air fan 19 are taken out to drawing 9 and drawing 10 , and it is shown in them using the perspective view. Moreover, light equipment 8 and the inhalation-of-air fan 19 are taken out to drawing 11 , and it is shown in it using the top view. Furthermore, the cross section in the B-B line of drawing 9 is shown in drawing 12 . As shown in these drawings, the inhalation-of-air fan 19 is stationed in the location which adjoins outside opening 840D which becomes light equipment 8 built into the projection mold display 1 with a bleeder. Therefore, of this inhalation-of-air fan 19, it sees in the compartment 850 of light

equipment 8 superficially, and the airstream for cooling as shown in drawing 12 by the arrow head D is formed in it. For this reason, since air circulation of a compartment 850 is promoted compared with the case where the inhalation-of-air fan 19 is not stationed, the cooling effectiveness of a lamp 81 improves.

[0038] The parts of the light source unit 9 and the projection lens unit 6 are taken out in drawing 13 , and it is shown in it. As shown in this drawing, the optical unit 9 has the composition that optical elements other than prism unit 910 which constitutes that color composition means were pinched and held from the upper and lower sides among the up-and-down light guides 901 and 902. The upper light guide 901 of these and the bottom light guide 902 are being fixed to the upper case 3 and lower case 4 side by the lockscrew, respectively. Moreover, the light guide plates 901 and 902 of these upper and lower sides are being fixed by the lockscrew as well as the prism unit 910 side. The prism unit 910 is being fixed to the rear face of the thick head plate 903 which is a dies casting plate by the lockscrew. Similarly the end face side of the projection lens unit 6 is being fixed to the front face of this head plate 903 by the lockscrew.

[0039] The outline configuration of the optical system included in the projection mold display 1 is shown in drawing 14 . The optical system of this example is equipped with the lamp 81 which is the component of the above-mentioned light equipment 8, and the homogeneity illumination-light study system 923 which consists of the integrator lenses 921 and the integrator lenses 922 which are a homogeneity illumination-light study component. Moreover, the color separation optical system 924 which separates into red, green, and each blue colored light bundles R, G, and B the white light bundle W by which outgoing radiation is carried out from the homogeneity illumination-light study system 923, The liquid crystal light valves 925R, 925G, and 925B of three sheets as a light valve which modulates each colored light bundle, It has the prism unit 910 as color composition optical system which re-compounds the modulated colored light bundle, and the projection lens unit 6 which carries out expansion projection of the compounded flux of light on the front face of a screen 10. Furthermore, it has the light guide system 927 which leads the blue glow bundle B to corresponding liquid crystal bulb 925B among each colored light bundle separated according to the color separation optical system 924.

[0040] The homogeneity illumination-light study system 923 is equipped with the reflective mirror 931, and it turns the main optical axis L of the outgoing radiation light from an illumination-light study system to equipment front, and he is trying to bend it at a right angle. This mirror 931 is pinched and it is arranged at the condition that the integrator lenses 921 and 922 intersect perpendicularly.

[0041] The outgoing radiation light from a lamp 81 will be projected as secondary light source images, respectively on the plane of incidence of each lens which constitutes the integrator lens 922 through this integrator lens 921, and an illuminated object will be irradiated using outgoing radiation light from the integrator lens 922 concerned.

[0042] Each color separation optical system 924 consists of a bluish green reflective dichroic mirror 941, a green reflective dichroic mirror 942, and a reflective mirror 943. In the bluish green reflective dichroic mirror 941, the blue glow bundle B included there and the green light bundle G are first reflected by the right angle, and the white light bundle W goes to the green reflective dichroic mirror 942 side.

[0043] This mirror 941 is passed, it is reflected by the right angle by the back reflective mirror 943, and outgoing radiation of the red flux of light R is carried out to the prism unit 910 side from the outgoing radiation section 944 of the red flux of light R. In the green reflective dichroic mirror 942, the green light bundle G is reflected by the right angle, and outgoing radiation of the blue and the green flux of lights B and G which were reflected in the mirror 941 is carried out to a color composition optical-system side from the outgoing radiation section 945 of the green light bundle G. Outgoing radiation of the blue glow bundle B which passed this mirror 942 is carried out to the light guide system 927 side from the outgoing radiation section 946 of the blue glow bundle B. In this example, it is set up so that all the distance from the outgoing radiation section of the white light bundle W of a homogeneity illumination-light study component to the outgoing radiation sections 944, 945, and 946 of each colored light bundle in the color separation optical system 924 may become equal.

[0044] Condenser lenses 951 and 952 are arranged at the outgoing radiation side of the red of the color separation optical system 942, and the outgoing radiation sections 944 and 945 of the green light bundles R and G, respectively. Therefore, incidence of the red and the green light bundles R and G which carried out outgoing radiation from each outgoing radiation section is carried out to these condenser lenses 951 and 952, and they are made parallel.
[0045] Thus, incidence of the red and the green light bundles R and G which were made parallel is carried out to the liquid crystal light valves 925R and 925G, they are modulated, and the image information corresponding to each colored light is added. That is, according to image information, switching control of these light valves is carried out by the non-illustrated driving means, and, thereby, the modulation of each colored light which passes through this is performed. Such a driving means can use a well-known means as it is. On the other hand, the blue glow bundle B is led to liquid crystal light valve 925B which corresponds through the light guide system 927, and a modulation is similarly performed in here according to image information. Poly-Si TFT can be used for the light valve of this example as a switching element.
[0046] The light guide system 927 consists of a middle lens 973 arranged between the condenser lens 954 arranged to the outgoing radiation side of the outgoing radiation section 946 of the blue glow bundle B, the incidence side reflective mirror 971, the outgoing radiation side reflective mirrors 972, and these mirrors, and a condenser lens 953 arranged to the near side of liquid crystal light valve 925B. The blue glow bundle B becomes the longest, therefore the quantity of light loss of this flux of light of distance from the optical path length 805, i.e., the light source lamp, of each colored light bundle to each liquid crystal panel increases most. However, quantity of light loss can be controlled by making the light guide system 927 intervene. Therefore, the optical path length of each colored light bundle can be substantially made into equivalence.
[0047] Next, incidence of each colored light bundle modulated through each liquid crystal panel 925R, and G and B is carried out to the color composition optical system 910, and it is re-compounded here. Color composition optical system consists of these examples using the prism unit 910 which consists of a dichroic prism as mentioned above. Here, expansion projection of the re-compounded color image is carried out on the front face of the screen 10 which is in a position through the projection lens unit 6.
[0048] Thus, in the constituted projection mold display 1, it has light equipment 8 which applied this invention as the light source. This light equipment 8 cools a lamp 81, as mentioned above, and even if a lamp 81 explodes, it is made for a lamp fragment to have not scattered to the exterior of light equipment 8 further. Therefore, the component part of the projection mold display 1 except light equipment 8 is not damaged with a lamp fragment, and, moreover, a life of a lamp can realize a long projection mold display.

[Translation done.]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the perspective view of the light equipment which applied this invention.
[Drawing 2] It is the outline cross-section block diagram of the light equipment shown in drawing 1 .
[Drawing 3] It is the perspective view taking out and showing the reflecting mirror of the light equipment shown in drawing 1 , and a part of lamp housing.
[Drawing 4] They are a reflecting mirror, a translucent plate, and the perspective view showing the appearance of the light equipment with which a partition wall is constituted by the side plate member.
[Drawing 5] It is an outline cross-section block diagram in the C-C line of drawing 4 .
[Drawing 6] It is the perspective view showing the appearance of the projection mold display equipped with the light equipment shown in drawing 1 .
[Drawing 7] It is the outline flat-surface block diagram showing the internal configuration of the projection mold display shown in drawing 6 .
[Drawing 8] It is an outline cross-section block diagram in the A-A line of drawing 7 .
[Drawing 9] It is drawing showing the appearance when seeing light equipment and an inhalation-of-air fan from the slanting upper part of transverse-plane approach.
[Drawing 10] It is drawing showing the appearance when seeing light equipment and an inhalation-of-air fan from the slanting upper part of rear-face approach.
[Drawing 11] It is the top view showing light equipment and an inhalation-of-air fan.
[Drawing 12] It is an outline cross-section block diagram in the B-B line of drawing 9 .
[Drawing 13] It is the outline flat-surface block diagram taking out and showing the parts of an optical unit and a projection lens unit.
[Drawing 14] It is the outline block diagram showing the optical system included in the optical unit.
[Description of Notations]
1 Projection Mold Display
2 Sheathing Case
3 Upper Case
4 Lower Case
5 Front Case
6 Projection Lens Unit
7 Power Supply Unit
8 8A Light equipment
9 Optical Unit
10 Screen
11 Interface Substrate
12 Video Substrate
13 Control Board
14R, 14L Loudspeaker
15A Inhalation-of-air fan

15B The fan for circulation
16 Ventilating Fan
17 Auxiliary Cooling Fan
18 Floppy Disk Unit
19 Inhalation-of-Air Fan for Cooling
201,202 Molybdenum foil
203,204 Molybdenum wire
81 Discharge Lamp
82 Reflecting Mirror
82A Opening
82B Opening edge
83 Lamp Housing
85 Terminal
86 Lamp Anchoring Hole
87 Side Plate Member
87A Opening
810 arc tubes
812 Light-emitting Part
813,814 Electrode seal section
815,816 Electrode arbor
817,818 Electrode
831 Mouthpiece
832 Nickel Lead Wire
840A, 840B, 840C, 840D Opening
841,842,843,844 Notching
845,846,847,848 Aperture
849 Translucent Plate
850 Compartment
851,852 Blockade plate
854,855 Metal mesh
860 Partition Wall
901,902 Light guide
903 Head Plate
910 Prism Unit
921,922 integrator lens
923 Homogeneity Illumination-Light Study System
924 Color Separation Optical System
925R, 925G, 925B Liquid crystal light valve
927 Light Guide System
931 Reflective Mirror
941 Bluish Green Reflective Dichroic Mirror
942 Green Reflective Dichroic Mirror
943 Reflective Mirror
944 Outgoing Radiation Section of Red Flux of Light R
945 Outgoing Radiation Section of Green Light Bundle G
946 Outgoing Radiation Section of Blue Glow Bundle B
951,952,953,954 Condenser lens
971 Incidence Side Reflective Mirror
972 Outgoing Radiation Side Reflective Mirror
973 Middle Lens

[Translation done.]

* NOTICES *

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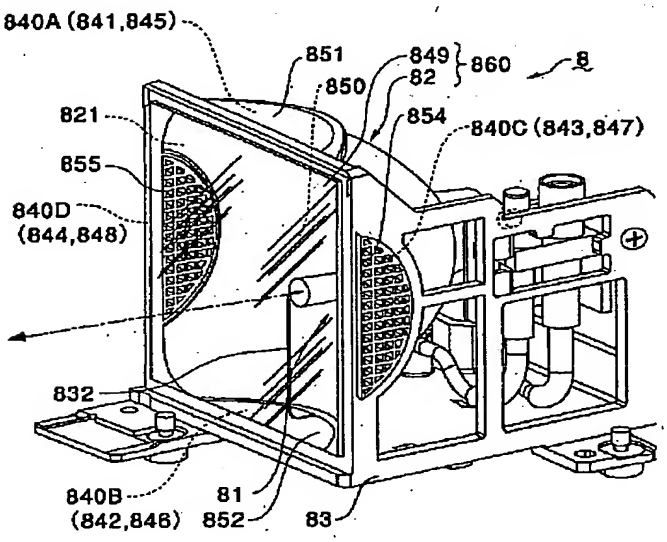
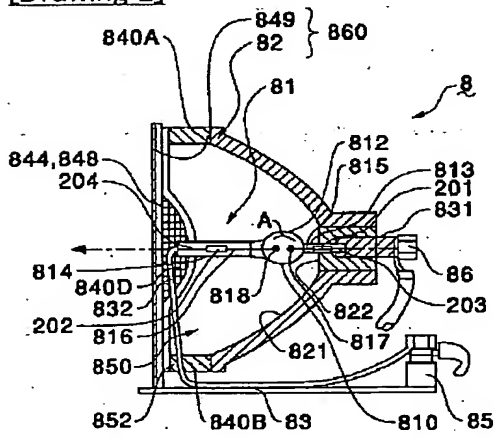
DRAWINGS

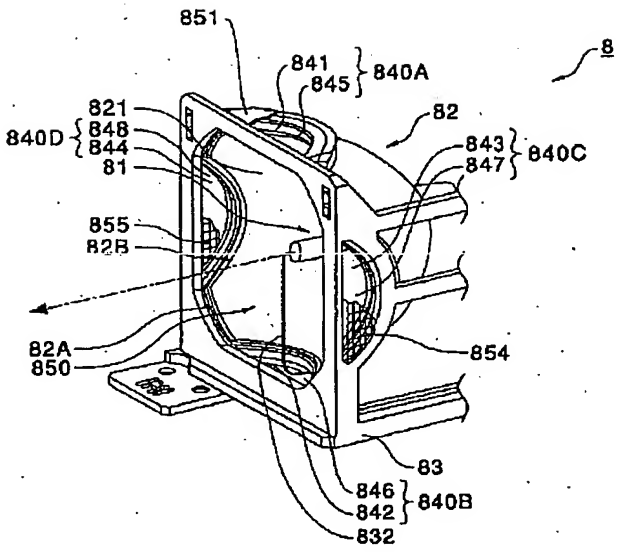
[Drawing 1]



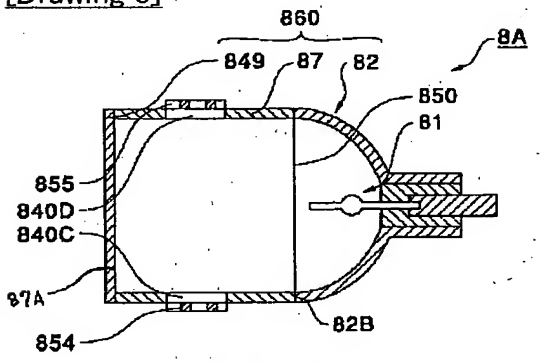
[Drawing 2]



[Drawing 3]

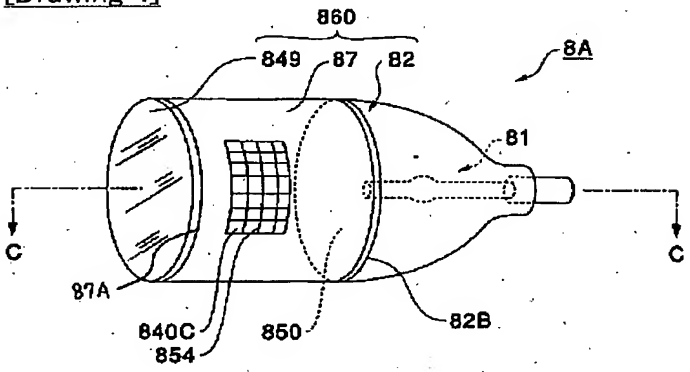


[Drawing 5]

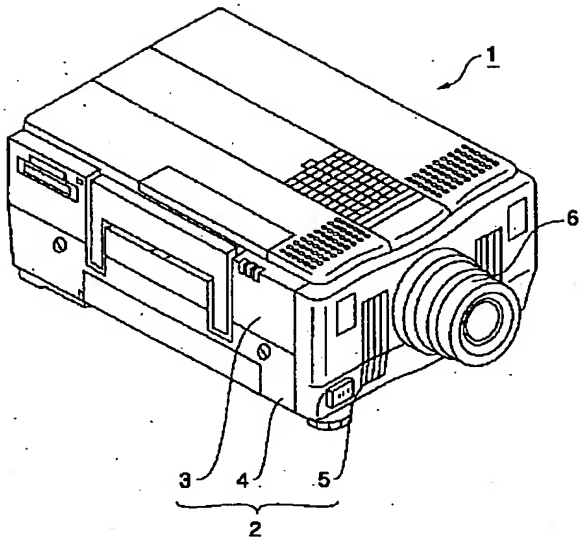


(C-C断面)

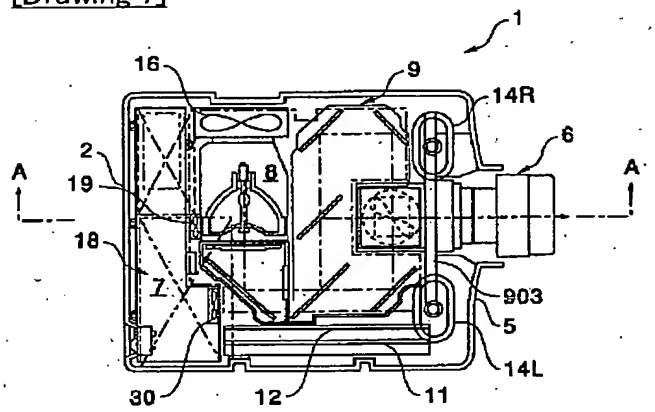
[Drawing 4]



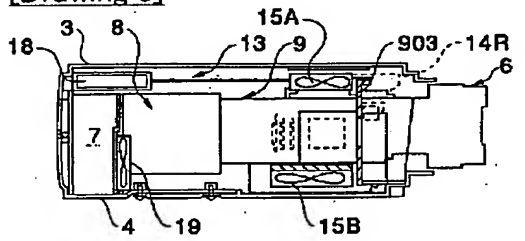
[Drawing 6]



[Drawing 7]

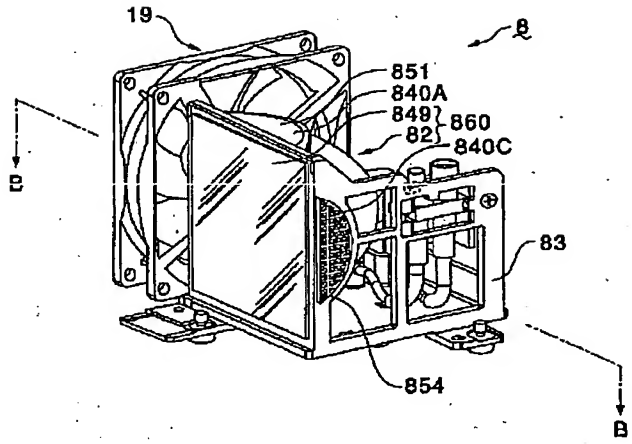


[Drawing 8]

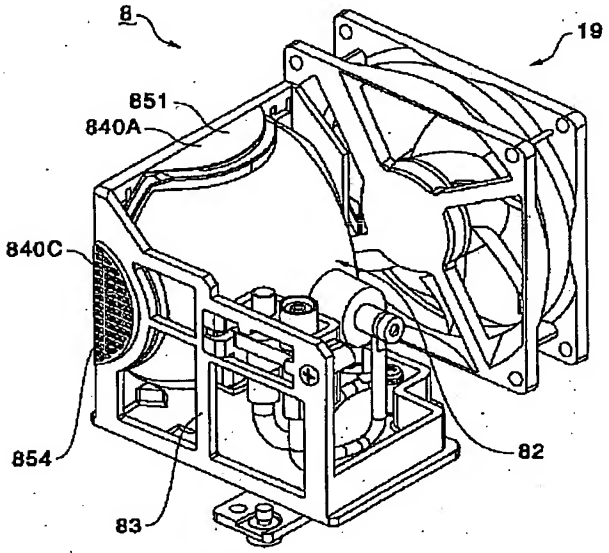


(A-A断面)

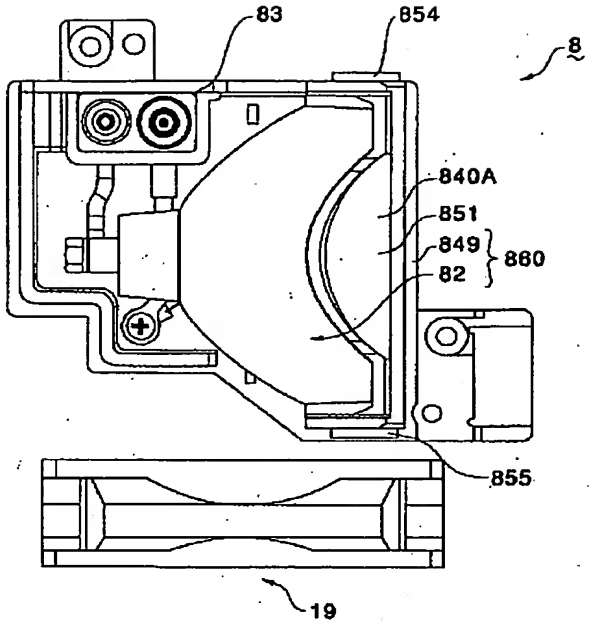
[Drawing 9]



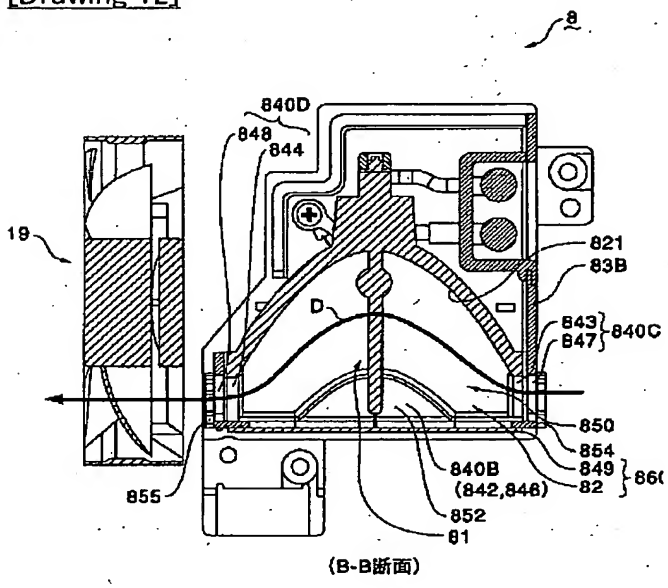
[Drawing 10]



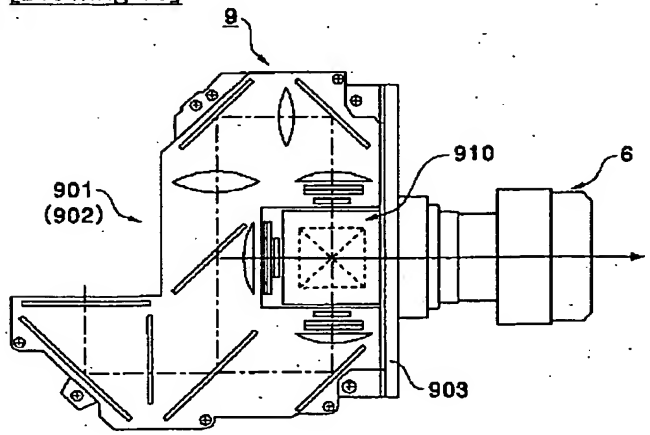
[Drawing 11]



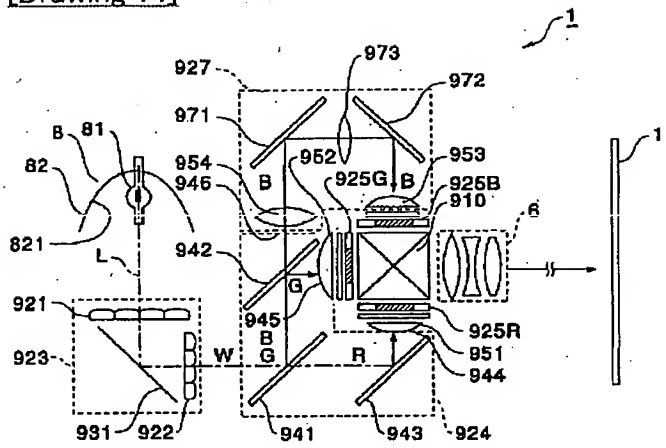
[Drawing 12]



[Drawing 13]



[Drawing 14]



[Translation done.]